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Department of Energy

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JAN 0 2 2003

Mr. James A. Saric, Remedial Project Manager
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Region V-SRF-5J
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DOE-0162-03

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
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TRANSMITTAL OF RESPONSES TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND OHIO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE INTEGRATED ENVIRONMENTAL PLAN, REVISION 3A AND ASSOCIATED CHANGE PAGES

This letter transmits the responses to the United States Environmental Protection Agency (USEPA) and Ohio Environmental Protection Agency (OEPA) comments on the Integrated Environmental Plan (IEMP), Revision 3A and associated change pages to the document for your approval.

During the December 10, 2002 weekly conference call, the USEPA and OEPA granted verbal approval to implement field changes associated with the IEMP, Revision 3A, with the exception of the air monitoring program. Consequently, Fluor Fernald began working under the new revision on January 1, 2003 with the exception of the air program modifications.

Change pages associated with the comment response document are provided as an enclosure for your review and approval. In addition to those change pages generated due to comment responses, three change pages are provided for the sediment section, which serve to correct minor errors that were discovered after the draft final document was transmitted. These edits do not affect the existing sediment sampling protocol, but merely provide clarification. The specific edits are as follows: Table 5-2 (added footnote a), Table 5-3 (added footnote d), and Pages 5-15 (reinstate samples pertain total uranium). Additionally, three updates are provided for the surface water section, which include updating pentachlorophenol sampling from monthly to quarterly and total residual chlorine from three/week to two/week at the parshall flume per the final National Pollutant

Discharge Elimination System (NPDES) permit and removing the field blank requirement, which was previously identified and approved during the 2001 IEMP Annual Review Update. Change pages are also provided for the updated cover, table of contents, and references.

Upon approval and insertion of associated change pages, the IEMP, Revision 3 will represent the completed version of the document for 2003 and 2004 environmental sampling and reporting protocol.

If you have any questions concerning the enclosed documents, please contact Kathleen Nickel at (513) 648-3166.

Sincerely,

Johnny Reising

FEMP:Nickel

Johnny W. Reising
Fernald Remedial Action
Project Manager

Enclosure: As Stated

cc w/enclosure:
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A. Murphy, OH/FEMP
M. Murphy, USEPA-V, AE-17J
T. Schneider, OEPA-Dayton (three copies of enclosure)
G. Jablonowski, USEPA-V, SRF-5J
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M. Cullerton, Tetra Tech
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cc w/o enclosure:
R. Greenberg, EM-31/CLOV
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T. Hagen, Fluor Fernald, Inc./MS9
W. Hertel, Fluor Fernald, Inc./MS52-5
S. Hinnefeld, Fluor Fernald, Inc./MS52-2
M. Jewett, Fluor Fernald, Inc./MS52-5
T. Poff, Fluor Fernald, Inc./MS65-2
C. Tablor, Fluor Fernald, Inc./MS90
ECDC, Fluor Fernald, Inc./MS52-7

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RESPONSES TO EPA AND OEPA COMMENTS ON THE INTEGRATED ENVIRONMENTAL MONITORING PLAN REVISION 3A, DRAFT FINAL

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 2003

U.S. DEPARTMENT OF ENERGY

RESPONSES TO EPA TECHNICAL COMMENTS ON THE INTEGRATED ENVIRONMENTAL MONITORING PLAN, REVISION 3A, DRAFT FINAL

GENERAL COMMENTS

1. Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not Applicable Pg.#: NA Line #: NA Code: NA
General Comment #: 1
Comment: The Integrated Environmental Monitoring Plan (IEMP) should be revised to provide more information on how certain types of information will be communicated to the U.S. Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA). Section 1.5.2 identifies three situations that would require the U.S. Department of Energy (DOE) to immediately notify U.S. EPA and OEPA. Similarly, Section 1.5.4 states that decisions made by the Closure Project Management organization regarding adjustments to project activities will be communicated to U.S. EPA and OEPA. These sections should be expanded to describe the mechanism for notifying the two agencies. For example, the text should state whether a telephone call will be made and followed up with a written notification.
Response: Sections 1.5.2 and 1.5.4 will be revised to include the method of communicating the specific situations or decisions discussed in these sections. Any situation described as requiring immediate notification (Section 1.5.2) to the EPA and OEPA will be communicated via a telephone call followed by written notification via a letter or the weekly conference call report. In the event that a particular project operation would need to be suspended or curtailed due to a pending, unacceptable environmental condition (rather than a regulatory limit exceedance) (Section 1.5.4), then notification is planned via the weekly teleconference call report.
Action: Text has been added to Section 1.5.2 to state that: "Immediate notification to the EPA and OEPA will be made via telephone followed by written communication in the form of a letter or the weekly conference call report." Additionally, text has been added to Section 1.5.4 to state that: "The Closure Project Regulatory Management organization's decision will be communicated to the EPA and OEPA via the weekly conference call agenda and report. The required change pages to the IEMP (pages 1-10 and 1-12) are provided as an attachment to this comment response document.

2. Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Pg.#: NA Line #: NA Code: NA
General Comment #: 2
Comment: Section 1.6 states that the IEMP will be revised every 2 years but, that if necessary, immediate, specific IEMP modifications will be made as data are reviewed. However, the text does not specify how such modifications will be communicated to U.S. EPA and OEPA. The text should be revised to state whether the modifications will be submitted to the agencies in the form of a complete, revised IEMP or brief addenda.
Response: DOE will continue to identify any immediate, specific IEMP modifications that may be required through the weekly conference calls. As has occurred to date, these modifications will be further summarized and communicated to the EPAs via the transmittal of annual reviews/updates for the years when a revised IEMP is not issued. IEMP annual reviews and revisions are transmitted to the EPA and OEPA in either October or November.
Action: Text has been added to Section 1.6 to state that: "These immediate changes will be communicated to the agencies through the weekly conference calls and documented in the next annual review update or revision, as appropriate." The required change page to the IEMP (page 1-12) is provided as an attachment to this comment response document.

SPECIFIC COMMENTS

3. Commenting Organization: U.S. EPA — Commentor: Saric
Section #: 1.5.2 — Pg.#: 1-10 — Line #: 8 to 11 — Code: NA
Specific Comment #: 1

Comment: The text indicates that DOE's response to undesirable data trends will be documented in weekly teleconferences. Currently, the weekly teleconference agenda is structured according to individual projects. Therefore, if IEMP data are likely to be discussed in future weekly teleconferences, an associated item should be added to the agenda.

Response: The "undesirable data trends" referred to in this IEMP section that may be worthy of discussion during the weekly conference call occur relatively infrequently. To date, the few undesirable trends or events that have occurred have been primarily limited to the surface water and groundwater programs and have therefore been included under the Aquifer Restoration Project conference call report. Although not anticipated, any other IEMP media data trends (air, sediment, biota) deemed undesirable that necessitate inclusion in the conference call report will be included under the Aquifer Restoration Project agenda unless it is more relevant to one of the other remedial projects included in the conference call agenda.

Action: No revision to the IEMP is required.

4. Commenting Organization: U.S. EPA — Commentor: Saric
Table No.: 2-1 — Pg.#: 2-5 — Line #: NA — Code: NA
Specific Comment #: 2

Comment: The table states that for Silos 1 and 2, an amendment to the record of decision is planned for regulatory agency review and approval. The table should be revised to clarify that for Silos 1 and 2, and explanation of significant difference is planned for regulatory agency review and approval.

Response: DOE agrees with the comment. The text has been revised and states that an explanation of significant difference document, rather than a record of decision amendment for Silo 1 and 2, is planned for regulatory agency review and approval.

Action: Text has been revised in Table 2-1 to state that: "An Explanation of Significant Differences document is planned for regulatory review and approval to permit disposal of Silos 1 and 2 materials as 11e.(2) waste at a permitted commercial disposal facility." The required change page to the IEMP (page 2-5) is provided as an attachment to this comment response document.

5. Commenting Organization: U.S. EPA — Commentor: Saric
Section #: 6.4.2.1 — Pg.#: 6-14 — Line #: 7 to 19 — Code: NA
Specific Comment #: 3

Comment: DOE proposes to reduce the number of background stations for radiological air particulate monitoring from two to one by eliminating AMS-16. This proposal appears to be reasonable based on recent data made available on the IEMP Data Information Site. However, DOE should support the proposal by providing data to demonstrate that (1) monitoring results for the two background stations (AMS-12 and AMS-16) over the past 5 years are comparable and (2) eliminating AMS-16 as opposed to AMS-12 will not affect how data from other fenceline monitoring stations are interpreted.

Response: Table 1 provides a summary of the annual average particulate concentrations measured at AMS-12 and AMS-16 from 1997 through 2001. In general, the annual average particulate concentrations measured at AMS-16 are slightly higher, yet comparable to, the concentrations measured at AMS-12. As noted in the summary table describing the changes to the IEMP, DOE is proposing to eliminate the AMS-16 location because the expansion of light industry in the area around AMS-16 may be creating conditions that are not entirely representative of a background location. There has been no consideration of eliminating AMS-12 because the area around AMS-12 is still representative of a background area.

TABLE 1

ANNUAL AVERAGE AIR PARTICULATE CONCENTRATIONS AT BACKGROUND LOCATIONS

Year & Location	Uranium[a] (pCi/m^3)			Thorium (pCi/m^3)			Radium (pCi/m^3)
	234	235/236	238	228	230	232	226
1997							
AMS-12	6.2E-06	ND	7.3E-06	6.4E-06	ND	5.6E-06	6.8E-06
AMS-16	1.2E-05	2.8E-06	1.3E-05	1.0E-05	9.3E-05	1.3E-05	1.1E-05
1998							
AMS-12	9.0E-06	4.7E-07	9.7E-06	5.3E-06	5.8E-06	4.8E-06	6.3E-06
AMS-16	1.6E-05	2.7E-07	1.5E-05	1.4E-06	1.7E-06	1.2E-05	5.1E-06
1999							
AMS-12	1.0E-05	1.5E-07	9.9E-06	3.6E-06	6.4E-06	3.9E-06	5.1E-06
AMS-16	1.3E-05	3.5E-07	1.3E-05	8.6E-06	1.4E-06	9.2E-06	2.5E-05
2000							
AMS-12	5.9E-06	1.9E-07	6.4E-06	5.5E-06	6.1E-06	3.6E-06	6.8E-05
AMS-16	7.2E-06	ND	7.4E-06	7.7E-06	8.9E-06	6.1E-06	8.0E-05
2001							
AMS-12	7.0E-06	ND	7.4E-06	4.9E-06	7.5E-06	3.9E-06	1.4E-04
AMS-16	9.4E-06	4.8E-07	1.1E-05	8.8E-06	9.5E-06	7.2E-06	1.7E-04

[a] ND – non-detect.

The expected net effect of eliminating AMS-16 was evaluated by calculating the maximum fenceline dose with and without the AMS-16 background monitoring results. The results of the evaluation are shown in Table 2 and indicate that eliminating the AMS-16 background monitor is expected to lead to a slightly higher maximum annual fenceline dose, thus making the dose estimates more conservative. This increase in the maximum annual fenceline dose (about 0.1 mrem) represents approximately 1 percent of the 10 mrem NESHAP limit. The increase is not large enough to significantly change the interpretation of data from other fenceline monitoring locations.

TABLE 2

EVALUATION OF MAXIMUM FENCELINE DOSE

Year	Maximum Fenceline Dose (mrem)	
	With AMS-16 data	Without AMS-16 data
1998[a]	0.26	0.36
1999	0.29	0.39
2000	1.07	1.12
2001	0.76	0.83

[a]First year that fenceline dose was calculated using average data from AMS-16 and AMS-12

Action: No revision to the IEMP is required.

6. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.2.1 Pg.#: 6-15 Line #: NA Code: NA
Specific Comment #: 4
Comment: DOE proposes to reduce the frequency of thorium analyses form biweekly to monthly and to eliminate the monthly analysis during months when a quarterly composite filter is to be

analyzed. Although the IEMP lists several factors supporting this proposal, thorium 230 remains the most significant radionuclide in terms of its contribution to the measured fenceline dose. Reducing the thorium analytical frequency during a period when cleanup activities are accelerating (as discussed in Section 6.1) seems questionable.

In particular, thorium emissions associated with increasing the Waste Pit dryer production rate and beginning Silo 3 operations are of concern. The IEMP states that thorium 230 concentrations have remained comparatively stable as dryer throughput has increased, but the document should be revised to provide data supporting this claim (including project-specific monitoring results). If the data demonstrate stable thorium 230 concentrations, monthly thorium analyses may be appropriate during the period before Silo 3 waste removal activities begin. At that point; however, biweekly thorium analyses should resume until DOE can demonstrate that Silo 3 activities are not having a significant effect on thorium concentrations in air.

Response: The following figure (Figure 1) provides a comparison between the estimated amount of thorium-230 processed by the WPRAP dryers and the corresponding thorium-230 concentrations at four fenceline monitors (AMS-2, 3, 8A, and 9C) that are along the eastern site boundary and typically downwind from the WPRAP area. As shown in the figure, during the period of operations from 10/19/00 through 4/21/02, there were periodic spikes in the thorium-230 concentrations at monitors along the eastern fenceline. These short-lived increases have been attributed to several factors including; higher thorium-230 concentrations in the dryer feed material, periodic excursions in the moisture content of dryer output (e.g. during dryer re-start after maintenance), and meteorological conditions.

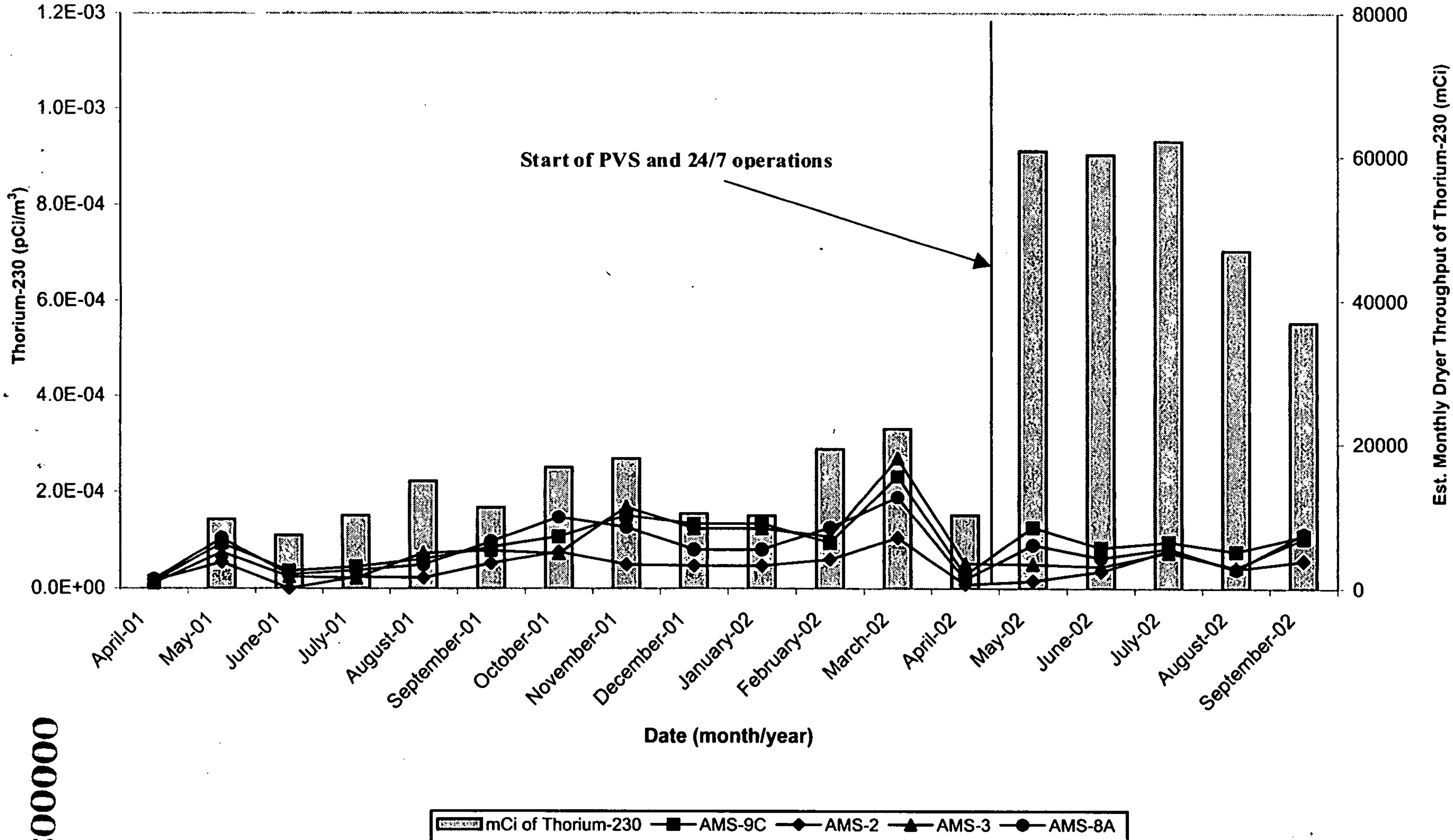
Following the start of the pugmill ventilation system on 4/22/02 the average thorium-230 concentrations at monitors along the eastern fenceline have decreased. Furthermore, any short-lived increases in biweekly thorium concentrations at the monitors have remained within the range of historical values. This is notable because WPRAP has been operating under a seven days per week/24 hours per day accelerated schedule, which increases both dryer throughput (tons/month) and the frequency of processing waste with elevated thorium-230 concentrations. In the absence of the pugmill ventilation system, these two conditions would likely increase the average fenceline thorium-230 concentrations and the number of any short-lived spikes. Based on these data, the pugmill ventilation system appears to be effective in capturing a significant fraction of the fugitive emissions from dryer/pugmill operations and moderating the number, magnitude, and duration of thorium-230 spikes at the fenceline monitors. These data also indicate that the annual average fenceline concentrations are expected to remain at levels such that the annual dose from emissions is well below the 10 mrem limit. Furthermore, the data support DOE's proposal to reduce the frequency of thorium analyses from biweekly to monthly and to eliminate the monthly analysis during months when a quarterly composite filter is to be analyzed.

DOE agrees to re-evaluate the frequency of fenceline thorium analysis prior to the start of the Silo 3 waste retrieval activities. It should be noted that biweekly thorium analysis is currently being performed at four project-specific environmental monitors located in the Silo area. The Silos Project Environmental Monitoring Plan (Fluor Fernald 2002) describes the location and analysis plan for these monitors. This plan was submitted for agency review as part of the Silos remedial design documents.

For clarity and consistency, DOE recommends that the level of historical detail included in the attached figure and this response remain in this comment response document rather than incorporation into the IEMP.

Action: No revision to the IEMP is required.

FIGURE 1 - COMPARISON OF MONTHLY THORIUM-230 FENCELINE CONCENTRATIONS AND WPRAP OPERATIONAL DATA



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7. Commenting Organization: U.S. EPA   Commentor: Saric
Section #: Not Applicable   Pg.#: NA   Line #: NA   Code: NA
Specific Comment #: 5

Comment: DOE proposes to reduce the number of radon background monitoring stations from two to one by eliminating AMS-16. This proposal appears to be reasonable based on recent data made available on the IEMP Data Information Site. However, DOE should support the proposal by providing data to demonstrate that (1) monitoring results for the two background stations (AMS-12 and ASM-16) over the past 5 years are comparable and (2) eliminating AMS-16 as opposed to AMS-12 will not affect how data from other fenceline monitoring stations are interpreted.

Response: Table 3 provides a summary of the annual average radon concentrations measured at AMS-12 and AMS-16 from 1997 through 2001. The results are comparable and any differences in the annual average concentrations at the two monitoring locations are within the limits of accuracy and precision for the monitoring instruments.

Based on data from 2000 and 2001, eliminating the background monitor at AMS-16 (as opposed to AMS-12) will lead to an annual average background radon concentration that is slightly higher, by about 0.1 pCi/L, than the average radon concentration determined by using data from both AMS-12 and AMS-16. This difference in the annual average radon concentration is within the limits of accuracy and precision for the monitoring instruments; and therefore, it is not large enough to affect the interpretation of data from other fenceline monitoring locations. As noted in description of changes to the IEMP, DOE is proposing to eliminate the AMS-16 location because the expansion of light industry in the area around AMS-16 may be creating conditions that are not entirely representative of a background area. There has been no consideration of eliminating AMS-12 because the area around AMS-12 is still representative of a background area.

TABLE 3

ANNUAL AVERAGE RADON CONCENTRATIONS AT BACKGROUND LOCATIONS

Year & Location	Radon Concentration (pCi/L)	
	AMS-12	AMS-16
1997	0.2	0.2
1998	0.3	0.4
1999	0.2	0.3
2000	0.3	0.2
2001	0.3	0.1

Action: No revision to the IEMP is required.

8. Commenting Organization: U.S. EPA   Commentor: Saric
Section #: 6.4.2.3   Pg.#: 6-21   Line #: 8 to 12   Code: NA
Specific Comment #: 6

Comment: DOE plans to add five new direct radiation monitoring stations (locations 43 through 47) in the Silo 1 and 2 area. However, comparison of the new locations shown in Figure 6-4 with the updated wind rose shown in Figure 6-2 revealed that all five locations are predominantly upwind of Silos 1 and 2. A review of the data from the last four quarters on the IEMP Data Information Site revealed that direct radiation levels tend to be highest at location 22, the location most likely to be downwind of the silos. The IEMP should be revised to (1) provide additional information on how the five new monitoring locations were selected and (2) explain why additional monitoring locations downwind of Silos 1 and 2 were not considered.

Response: In response to this comment, some technical details related to the IEMP direct radiation (x-ray and gamma) monitoring program need to be identified. Specifically, the environmental dosimeters used in the IEMP direct radiation monitoring program are not sensitive to the very small increase in direct radiation levels associated with the elevated ambient radon concentrations in the vicinity of the silos. Therefore, the response of the dosimeters is not affected by its downwind or upwind location with respect to Silos 1 and 2. The response of the dosimeters is strongly dependent on the distance between the dosimeter and the source of radiation. This, in part, explains why the dosimeter at location 22, which is comparatively close to Silo 2, tends to have the highest reading. The environmental dosimeters are capable of measuring the changes in direct (x-ray and gamma) radiation levels associated with radon concentrations in the millions of pCi/L, such as those that exist in the silo headspace. The dosimeters are also capable of measuring the direct radiation emitted from the waste material stored in Silos 1 and 2, beneath the bentonite layer.

Two of the five new monitoring locations (43 & 44) were selected based on the need to monitor direct radiation levels from the Silos 1 and 2 wastes as the berm is excavated. The excavation of the berm will change the radiation shielding in place around the Silos and may affect radiation levels at the fenceline. These locations will also serve as secondary monitoring locations in the event that Silo construction activity eliminates locations 23A, 24, 25, and 26. Three new monitoring locations (45, 46, & 47) were selected based on the need to monitor direct radiation levels from the Silo wastes and their associated high levels of radon as the wastes are transferred from Silos 1 and 2 to the transfer tank area, and eventually to the waste treatment facility. The location of these buildings within the Silos area is included in Figure 6-4 of the IEMP, Rev. 3A. More specifically, the new locations were selected to monitor the movement of these materials as it affects radiation levels at the site fenceline.

Action: The paragraph identified in the response has been added to Section 6.4.2.3. The required change pages to the IEMP (pages 6-21 through 26) are provided as an attachment to this comment response document. Note that the new text is specifically included on page 6-21; however, due to the amount of text added, additional change pages are necessary.

9. Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.6 Pg.#: 6-34 Line #: NA Code: NA
Specific Comment #: 7

Comment: DOE proposes to reduce the reporting frequency for air monitoring data from quarterly to semiannual. In its summary of IEMP changes, DOE also commits to "continual posting of data to the IEMP Data Information Site as data becomes available." These postings should not be limited to the raw data that currently occupy this site. The postings should also include the statistical summaries mentioned throughout Section 6.6, including the following:

- "Basic statistics, such as minimum, maximum, and mean" that will be"generated per sample location on a routine basis" for radiological air particulate data (see Section 6.6.1.1)

- "Basic statistics, such as minimum, maximum, and mean" that "will be generated on a monthly basis" for radon data (see Section 6.6.1.2)

- "Basic statistics, such as minimum, maximum, and mean" that "will be generated on a quarterly basis" for direct radiation data (see Section 6.6.1.3).

Response: The text referenced in the comment describes the general data evaluation practices performed by DOE and its contractors in their own review of air monitoring data. It was not meant to describe the content of data files posted to the IEMP Data Information Site. The content and format of the data posted on the IEMP Data Information Site has been developed to allow a range of users to import the raw data files into a range of software programs and perform their own evaluations on the data. DOE has worked with the regulatory agencies in developing the file formats and believes the existing formats meet most users' needs while minimizing the possibility that files will be incompatible with the users' software of choice.

DOE is continuing the development of programming that will allow users of the IEMP Data Information Site to generate graphs of the data posted to the site. The graphics programming, which is expected to be complete and available for use in 2003, will provide users with graphical information on minimum and maximum values for a given time period.

Action: No revision to the IEMP is required.

RESPONSES TO OEPA COMMENTS ON THE INTEGRATED ENVIRONMENTAL MONITORING PLAN, REVISION 3A, DRAFT FINAL

COMMENTS

10. Commenting Organization: Ohio EPA | Commentor: OFFO
Section #: 3.2.2.2 | Pg.#: 3-6 | Line #: NA | Code: C
Original Comment #: 1
Comment: Comment although a public water supply is now available, a groundwater dose assessment may be useful for tracking the effectiveness of the groundwater remediation effort. Since historical dose assessments for groundwater are available, a trend can be shown to demonstrate how potential dose has been reduced during groundwater remediation. DOE needs to discuss the proposed elimination of groundwater dose assessment with members of the public.
Response: Groundwater dose assessments were discontinued after issuance of the 1996 Integrated Site Environmental Report (DOE 1997). The 1997 and 1998 Integrated Site Environmental Reports noted (on page 109 of both reports, DOE 1998 and DOE 1999, respectively) that the installation of the public water supply "eliminated the groundwater pathway as a source of dose from FEMP operations; therefore, dose from drinking water is no longer reported." The continued inclusion of the dose assessment for the groundwater pathway in Table 3-1 of the IEMP was an oversight that was found during preparation of the IEMP Revision 3A. The requirement was removed to be consistent with what was determined after the public water supply came on line.

Due to the FEMP's groundwater remedy being concentration – based, the DOE prefers to use the established EPA/OEPA approved tools for tracking the effectiveness of the groundwater remediation effort, rather than re-establishing the use of a groundwater dose assessment. Tools such as uranium plume maps and uranium concentration versus time plots for all the wells in the IEMP specified groundwater remedy performance sampling program appear to be effective techniques for tracking the groundwater clean up. Given that the public water supply has essentially eliminated the groundwater dose pathway, DOE believes it would be misleading to continue to show a dose from this pathway.
Action: No revision to the IEMP is required.

11. Commenting Organization: Ohio EPA | Commentor: GeoTrans, Inc.
Section #: 3 | Pg.#: 3-14 | Line #: 34 | Code: E
Original Comment #: 2
Comment: Change were attributed to; to "were attributed to".
Response: DOE agrees with the comment. The semicolon has been removed.
Action: The text has been updated by removing the semicolon. The required change page to the IEMP (page 3-14) is provided as an attachment to this comment response document.

12. Commenting Organization: Ohio EPA | Commentor: OFFO
Section #: Figure 3-3 | Pg.#: 3-15 | Line #: Tables | Code: C
Original Comment #: 3
Comment: Check the indicated location of the injection basin in this figure. The indicated location is somewhat to the north west of the actual location.
Response: The injection basin location on Figure 3-3 is consistent with the approved Design for Remediation of the Great Miami Aquifer South Field Phase II Module. The injection basin shown on Figure 3-3 will be fed with both storm water runoff and treated groundwater. The commentor may be referring to the former Southern Waste Unit (SWU) Storm Water Basin 2, which is located southeast of the basin note on Figure 3-3. DOE is planning to direct storm water runoff to the former SWU # 2 basin for potential infiltration. However, sustained infiltration through the bottom of the SWU # 2 basin is uncertain due to unknown sediment load in the runoff. Therefore, use of SWU basin 2 for infiltration was not considered in the modeling conducted to support the design of the South Field Phase II Groundwater Restoration Module.
Action: No revision to the IEMP is required.

13. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-17 Line #: 2 Code: C
Original Comment #: 4
Comment: Please provide well construction details for the following wells: 33263, 33061, 33253, 33254, 33255, 32761, 33062, and 33063. Well construction information could not be located on the Fernald Extranet Site.
Response: The requested well construction information has been added to the IEMP Data Information Site.
Action: No revision to the IEMP is required; however, the IEMP Data Information Site has been updated with the requested information.

14. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 3.4.2.2 Pg.#: 3-18 Line #: 4th from top of page Code: C
Original Comment #: 5
Comment: "Four of the five aquifer zones (Aquifer Zones 1 through 4) contain aquifer restoration modules." Figure 3-4 does not show a module in Zone 3.
Response: DOE agrees with the comment. There is currently no planned aquifer restoration module for Aquifer Zone 3.
Action: Revise the subject text as follows: "Three of the five aquifer zones (Aquifer Zones 1, 2, and 4) contain aquifer restoration modules." The required change page to the IEMP (page 3-18) is provided as an attachment to this comment response document.

15. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-20 Line #: 13 Code: E
Original Comment #: 6
Comment: Remove comma after "locations."
Response: DOE agrees with the comment. The comma has been removed.
Action: The text has been updated by removing the comma. The required change page to the IEMP (page 3-20) is provided as an attachment to this comment response document.

16. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-28 Table 3-4 Line #: NA Code: C
Original Comment #: 7
Comment: Please provide well construction details for the following monitoring wells 22204, 22205, 22199, 31217, and 82433. Well construction information could not be located on the Fernald Extranet Site.
Response: The requested well construction information has been added to the IEMP Data Information Site.
Action: No revision to the IEMP is required; however, the IEMP Data Information Site has been updated with the requested information.

17. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: Figure 3-7 Pg.#: 3-39 Line #: Code: C
Original Comment #: 8
Comment: The symbol for the direct-push sampling locations is poorly reproduced in our copies of this plan and it cannot be distinguished from a filled-in circle.
Response: DOE agrees with the comment. Figure 3-7 has been updated with a filled in circle being used to locate direct-push geoprobe locations.
Action: Figure 3-7 has been updated per response. The required change page to the IEMP (page 3-39) is provided as an attachment to this comment response document.

18. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-41 Line #: 5 Code: E
Original Comment #: 9
Comment: Remove "1" after Exceedances.
Response: DOE agrees with the comment.
Action: The text has been updated by removing "1" after exceedances. The required change page to the IEMP (page 3-41) is provided as an attachment to this comment response document.

19. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-57 Line #: 23 Code: C
Original Comment #: 10
Comment: The model discussion in Section 3. 1 should be updated to clearly document the following:

- DOE'S transition from the Sandia Waste Isolation Flow and Transport (SWIFT) Model to the Variably Saturated Analysis Model in 3-Dimensions (VAM3D) Model for all site modeling operations.

- How the site wide model (referenced in Figure 3-9 and in the model calibration discussion on Page 3-59) will relate to the ZOOM model for the purposes of this plan, specifically with regard to any flow model re-calibration activities.

- The relationship between the ZOOM model and the site wide model with regard to future modeling performed in support remedial design.

Response: As mentioned in the comment and implied by the text on Pages 3-59 and 3-60, DOE has transitioned from the Sandia Waste Isolation Flow and Transport (SWIFT) groundwater modeling code to the Variably Saturated Analysis Model in 3-Dimensions (VAM3D) modeling code for all site groundwater modeling operations. This transition has been documented in detail in Development and Verification of VAM3DF, a Numerical Flow and Transport Modeling Code (HydroGeologic for Fluor Daniel Fernald, 1998).

The groundwater modeling grid used in the SWIFT model was retained for the VAM3D model. However, vertical discretization of the model was increased in the VAM3D model to 12 vertical layers instead of the six layers used in the SWIFT model.

The 12-layer VAM3D model was re-calibrated to current groundwater elevations in May 2000 with calibration activities detailed in Great Miami Aquifer VAM3D Flow Model Recalibration (DOE 2000). Because of significant seasonal changes in Great Miami Aquifer groundwater elevations, three sets of steady state flow model boundary conditions were developed for the VAM3D model as a result of the re-calibration effort. These three steady state flow model boundary conditions correspond to nominal groundwater elevations, and minimum and maximum groundwater elevations observed during the wet and dry seasons of the year, respectively. The wet and dry boundary condition data sets will be used in future groundwater modeling activities to predict aquifer remedy performance under those conditions.

DOE is currently investigating the application of Data Fusion Modeling (DFM) to site groundwater modeling activities. DFM is an advanced and computationally intensive groundwater modeling methodology. To facilitate the application of DFM, a local VAM3D ZOOM model was designed covering a smaller area than the 12-layer VAM3D model. The VAM3D ZOOM model contains 14 layers and covers an area just large enough to encompass the total uranium plume and the extraction/re-injection wells in the aquifer remedy. The VAM3D ZOOM model design is documented in Integration of Data Fusion Modeling (DFM) with VAM3DF Contaminant Transport Code (HydroGeoLogic prepared for Fluor Fernald, 2000).

Because the ZOOM model boundaries are near some of the aquifer remedy extraction wells, ZOOM model steady state flow boundaries must be derived from the larger 12-layer VAM3D model to avoid model boundary effects impacting flow model predictions of remedy performance. For all current and future operational flow modeling activities, aquifer remedy pumping/re-injection scenarios are first run to steady state in the large 12-layer VAM3D model then ZOOM model boundary values are derived from the output of the 12-layer flow model run. This technique is described in more detail in Design for Remediation of the Great Miami Aquifer South Field Phase II Module (DOE 2002).

A similar approach will be used in any future re-calibration efforts for the site groundwater model. The large 12-layer VAM3D model will be re-calibrated to observe groundwater elevation data then VAM3D ZOOM model boundary conditions will be derived from the large 12-layer VAM3D model.

Action: The text on Pages 3-59 and 3-60 will be changed to reflect the above response as follows (Italic and strikeout are used in the text below to assist the commentor by identifying the added and deleted text. However, the change pages do not include the italic and strikeout features):

Since modeling was conducted for the remedial investigation/feasibility study and Baseline Remedial Strategy Report, the model has undergone several changes in order to improve its capability for making water level and uranium concentration predictions. *DOE has transitioned from the Sandia Waste Isolation Flow and Transport (SWIFT) groundwater modeling code to the Variably Saturated Analysis Model in 3-Dimensions (VAM3D) modeling code for all site groundwater modeling operations. This transition has been documented in detail in Development and Verification of VAM3DF, a Numerical Flow and Transport Modeling Code (HydroGeologic prepared for Fluor Daniel Fernald, 1998).*

The groundwater modeling grid used in the SWIFT model was retained for the VAM3D model. However, vertical discretization of the model was increased in the VAM3D model to 12 vertical layers instead of the six layers used in the SWIFT model.

The groundwater model was re-calibrated for flow to address ~~transient~~ *observed changes in* water level conditions *and to address seasonal changes in water levels* prior to it being used to support the design of the Waste Storage Area Module *in 2001* and South Field Phase II Module in 2002. ~~The current model now uses three sets of boundary conditions (wet, dry, and nominal).~~ *The 12-layer VAM3D model was re-calibrated to current groundwater elevations in May 2000 with calibration activities detailed in Great Miami Aquifer VAM3D Flow Model Re-Calibration (DOE 2000). Because of significant seasonal changes in Great Miami Aquifer groundwater elevations, three sets of steady state flow model boundary conditions were developed for the VAM3D model as a result of the re-calibration effort. These three steady state flow model boundary conditions correspond to nominal groundwater elevations, and minimum and maximum groundwater elevations observed during the wet and dry seasons of the year, respectively. The wet and dry boundary condition data sets will be used in future groundwater modeling activities to predict aquifer remedy performance under those conditions.*

DOE is currently investigating the application of Data Fusion Modeling (DFM) to site groundwater modeling activities. DFM is an advanced and computationally intensive groundwater modeling methodology. To facilitate the application of DFM, a local VAM3D ZOOM model was designed covering a smaller area than the 12-layer VAM3D model. The VAM3D ZOOM model contains 14 layers and covers an area just large enough to encompass the total uranium plume and the extraction/re-injection wells in the aquifer remedy. The VAM3D ZOOM model design is documented in Integration of Data Fusion Modeling (DFM) with VAM3DF Contaminant Transport Code (HydroGeoLogic prepared for Fluor Fernald, 2000).

Because the ZOOM model boundaries are near some of the aquifer remedy extraction wells, ZOOM model steady state flow boundaries must be derived from the larger 12-layer VAM3D model to avoid model boundary effects impacting flow model predictions of remedy performance. For all current and future operational flow modeling activities, aquifer remedy pumping/re-injection scenarios are first run to steady state in the large 12-layer VAM3D model then ZOOM model boundary values are derived from the output of the 12-layer flow model run. This technique is described in more detail in Design for Remediation of the Great Miami Aquifer South Field Phase II Module (DOE 2002).

It is understood that the groundwater model may need to be re-calibrated in the future for flow if measured water levels and model predictions are not adequate for managing the remedy. Should future flow model calibration efforts be performed *the large 12-layer VAM3D model will be re-calibrated to observed groundwater elevation data, then VAM3D ZOOM model boundary conditions will be derived from the large 12-layer VAM3D model.*

Calibration standards will be the same as those ~~they will be conducted to the same standard~~ used to calibrate the Sandia Waste Isolation Flow and Transport (SWIFT) model.

~~However, the~~ *The* basic strategy for assessing flow predictions will be as follows:

The required change pages to the IEMP (pages 3-59 through 66) are provided as an attachment to this comment response document. Note that the new text is specifically included on pages 3-59 and 3-60; however, due to the amount of text added, additional change pages are necessary.

20. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-59 Line #: 3 Code: C
Original Comment #: 11
Comment: The text is misleading because it implies that transient water levels were simulated using the model. All of the models assumed steady-state conditions (i.e., the "wet," "dry,"and "nominal" water level boundaries were assumed to represent steady state conditions). No transient model simulations (i.e., modeling that included the simulation of changes in the amount of water contained in aquifer storage) have been discussed in any recent DOE documents that reference the site groundwater model. The text, therefore, should be clarified to indicate that each of the models developed assume a steady-state condition for the aquifer.
Response: DOE agrees that the text should be clarified to reflect that all the FEMP groundwater flow modeling performed with the VAM3D model is steady state.
Action: The text has been has been revised as per Action #19. The required change pages to the IEMP (pages 3-59 through 66) are provided as an attachment to this comment response document. Note that the new text is specifically included on pages 3-59 and 3-60; however, due to the amount of text added, additional change pages are necessary.

21. Commenting Organization: Ohio EPA Commentor: GeoTrans, Inc.
Section #: 3 Pg.#: 3-60 Line #: 12 Code: C
Original Comment #: 12
Comment: Will the routine IEMP reports be used to report the results from the study to investigative uranium sorption and partitioning on Great Miami Aquifer sediments". If the IEMP reports are not used for this purpose, how will the study results be reported?
Response: The overall study results will be reported in a stand-alone report. However, periodic updates of the status of the study/results will be provided during the weekly conference calls or during meetings/conference calls set up specifically to discuss results of this study.
Action: As noted in comment response. No revision to the IEMP is required.

22. Commenting Organization: Ohio EPA Commentor: DSW
Section #: Extranet Pg.#: Sediment Line #: Query Code: C
Original Comment #: 13
Comment: There is no data, only a location file in the sediment query link on the Extranet site.
Response: DOE agrees with the comment. Although the annual sediment data has always been included in files available for download via the IEMP Data Information Site, the sediment data query feature will be added to the site.
Action: DOE has added the sediment data query feature to the IEMP Data Information Site that enables users to obtain annual sediment data collected from 1999 to present.

23. Commenting Organization: Ohio EPA Commentor: DSW
Section #: 5.0 Pg.#: 5-19 Line #: Fig. 5-3 Code: C
Original Comment #: 14

Comment: The last bullet under the IEMP Actions is both cases are to report information to the OEPA in the next midyear data summary and annual report. In practice, this kind of information has been communicated in the weekly briefings, and this more timely communication is encouraged to continue, in addition to that stated in the decision tree in Figure 5-3.

Response: To date, the IEMP sediment data (the subject of Figure 5-3) has only been communicated through the annual site environmental report and the IEMP Data Information Site, not in the weekly conference call report. DOE prefers to keep the agenda for the weekly conference call primarily focused on remediation status/issues and project-critical data results (e.g., OSDF LCS and LDS results and volumes).

Action: No revision to the IEMP is required.

24. Commenting Organization: Ohio EPA Commentor: OFFO
Section #: 6.4.2.1 Pg.#: 6-14 Line #: NA Code: C
Original Comment #: 15

Comment: While past performance of the background air monitoring station suggests that only one background station is necessary, what contingencies have been made for unforeseen situations that may render the station inoperable for an extended period of time?

Response: There are several options available to account for background air results in the unlikely event that situations render the AMS-12 station inoperable for an extended period of time. These options include:

- Placing a monitor at an alternate or temporary location such as one of the former offsite locations that operated prior to 1998
- Using average background data from the most recent 5 years of monitoring as a substitute for any missing results
- Establishing a temporary monitoring location where access agreements and electrical power already exist or are readily available, such as an upwind well location.

It should be noted that prior to implementing any alternative for background air monitoring, the DOE would consult and gain the approval of the regulatory agencies. The commentor is referred to Comment Response #7 for additional information on the proposal to rely on AMS-12 as the sole background air monitor.

Action: No revision to the IEMP is required.

REFERENCES

Fluor Fernald, 2002, "Silos Project Environmental Monitoring Plan," 40000-PL-0010, Revision 2, Fluor Fernald, Cincinnati, OH.

HydroGeoLogic, Inc., 2000, "Integration of Data Fusion Modeling (DFM) with VAM3DF Contaminant Transport Code" Final, Herndon, VA.

HydroGeoLogic, Inc., 1998, "Development and Verification of VAM3DF, a Numerical Flow and Transport Modeling Code," Final, Herndon, VA.

U.S. Dept. of Energy, 2002, "Design for Remediation of the Great Miami Aquifer South Field Phase II Module," Draft Final, Revision A, Fernald Environmental Management Project, U.S. Dept. of Energy, Cincinnati, OH.

U.S. Dept. of Energy, 2000, "The Great Miami Aquifer VAM3D Flow Model Recalibration Report," Fernald Environmental Management Project, U.S. Dept. of Energy, Fernald Area Office, Cincinnati, OH.

U.S. Dept. of Energy, 1999, "1998 Integrated Site Environmental Report," Final, Fernald Environmental Management Project, U.S. Dept. of Energy, Fernald Area Office, Cincinnati, OH

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U.S. Dept. of Energy, 1997, "1996 Integrated Site Environmental Report," Final, Fernald Environmental Management Project, U.S. Dept. of Energy, Fernald Area Office, Cincinnati, OH

ATTACHMENT A

CHANGE PAGES FOR THE INTEGRATED ENVIRONMENTAL MONITORING PLAN (IEMP) REV. 3, FINAL

ATTACHMENT A

- 4669

CHANGE PAGE CROSS REFERENCE LIST

Sections	Change Pages	Reason for Update
Cover, Spine & Title Pg.		To reflect Final Transmittal Status
Table of Contents	i through ix	Necessary due to Change Page Updates
1	1-9 through 1-12	Comment Responses/Actions #1 and #2
2	2-5 through 2-6	Comment Response/Action #4
3	3-13 through 3-14; 3-17 through 3-20; 3-39 through 3-42; 3-59 through 3-66	Comment Responses/Actions #11, #14, #15, #17, #18, #19, and #20
4	4-17 through 4-18	Minor update in Table 4-3 (PF 4001 Pentachlorophenol sampled Quarterly rather than Monthly per final NPDES Permit)
	4-35 through 4-36	Removed field blank requirement which was already agreed upon per the 2001 IEMP Annual Review Update
5	5-11 through 5-16	Minor error in Tables 5-2 and 5-3: added footnote a and d, respectively Identified rinsate is associated with total uranium
6	6-21 through 6-26	Comment Response/Action #8
References	R-1 through R-3	Necessary due to Change Page Updates

Note: Change pages are two-sided.

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INTEGRATED ENVIRONMENTAL MONITORING PLAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

JANUARY 2003

U.S. DEPARTMENT OF ENERGY

FINAL

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LIST OF ACRONYMS

AMS	air monitoring station
ANSI	American National Standards Institute
ARAR	applicable or relevant and appropriate requirement
ARPA	Archaeological Resources Protection Act
ARP	Aquifer Restoration Project
ASL	analytical support level
AWWT	advanced wastewater treatment facility
BAT	Best Available Technology
BTVs	benchmark toxicity values
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPRD	continuous passive radon detector
CWA	Clean Water Act
D&D	decontamination and dismantling
DCF	dose conversion factors
DOE	U.S. Department of Energy
EMP	Fernald Site Environmental Monitoring Plan
EPA	U.S. Environmental Protection Agency
FEMP	Fernald Environmental Management Project
FFA	Federal Facility Agreement
FFCA	Federal Facility Compliance Agreement
FRL	final remediation level
GPMPP	Groundwater Protection Management Program Plan
HAMDC	Highest Allowable Minimum Detection Concentration
IEMP	Integrated Environmental Monitoring Plan
MCL	maximum contaminant level
MDC	minimum detectable concentration
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards Hazardous Air Pollutant
NHPA	National Historic Preservation Act
NPDES	National Pollutant Discharge Elimination System
NRMP	National Resource Monitoring Plan
NRRP	Natural Resource Restoration Plan
NTU	Nephelometric Turbidity Units
O&M	operations and maintenance
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency

LIST OF ACRONYMS
(Continued)

ORC	Ohio Revised Code
OSDF	on-site disposal facility
OU	Operable Unit
PRG	preliminary remediation goal
PRRS	Paddys Run Road Site
PSP	project specific plan
RI/FS	remedial investigation/feasibility study
RCRA	Resource Conservation and Recovery Act
SCQ	FEMP Sitewide CERCLA Quality Assurance Project Plan
SWIFT	Sandia Waste Isolation Flow and Transport
TLD	thermoluminescent dosimeter
WPRAP	Waste Pits Remedial Action Project
cm	centimeter
m^3	cubic meter
Ci/g	Curies per gram
m/min	meters per minute
μg/g	micrograms per gram
μg/L	micrograms per liter
μm	micron
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mrem	millirem
pCi/g	picoCuries per gram
pCi/kg	picoCuries per kilogram
pCi/L	picoCuries per liter
pCi/m^2/sec	picoCuries per square meter per second

- What specific response actions must be taken to address the situation, and which projects are affected?
- What communications are necessary with regulatory agencies or other concerned stakeholders as a result of the situation and/or decisions made?

The response action decisions necessary to address potentially undesirable cumulative effects could involve:

- Upgrading project-specific emissions controls (beyond those that are regulatory based) for one or more projects to reduce cumulative emissions further
- Slowing the pace of activities within one or more remedial projects for a specified period of time
- Altering the number or variety of active projects underway at a particular time
- Continued monitoring of cumulative data trends.

As discussed in the next subsection, FEMP decision-makers will be conducting ongoing evaluations of the data generated by both the projects and the IEMP to ensure satisfactory operating conditions are maintained during remedy implementation.

1.5.2 Who is Responsible for Making the Decisions?

The FEMP's sitewide environmental data is used by FEMP management personnel to closely monitor the acceptability of the various remedial projects underway at any particular time. Thus, the bulk of the day-to-day planning and routine operating decisions will be internal to the FEMP, with process adjustments implemented as necessary on a situation-specific, as-needed basis.

It is anticipated that in the vast majority of cases, the data evaluation will conclude that all regulatory requirements are being met and that no unacceptable cumulative trends in the monitoring data are present. The FEMP's evaluation and conclusions will be documented for regulatory agency concurrence through the normal reporting mechanisms described in this plan.

The FEMP will notify the U.S. Environmental Protection Agency (EPA) and the OEPA immediately (prior to taking an action internally) for three important, albeit unlikely, situations:

- The FEMP's evaluation indicates that a regulatory schedule milestone is in jeopardy of attainment because of the mitigative actions necessary to address an adverse cumulative situation

- For the air pathway, the FEMP's data evaluation indicates that an actual current condition has resulted in an exceedance of a NESHAP regulatory compliance limit (as opposed to an undesirable data trend indicating the potential for an unacceptable hypothetical future condition)

- For the air pathway, a projected exceedance of a NESHAP regulatory compliance level is believed to be imminent.

For these three special cases, the FEMP will: 1) identify the root cause of the unacceptable situation; 2) determine the options for addressing the problem; and 3) communicate with EPA and OEPA to arrive at a mutually acceptable decision concerning the follow-up actions to be taken. Immediate notification to the EPA and OEPA will be made via telephone followed by written communication in the form of a letter or the weekly conference call report. For all remaining situations (i.e., those involving the FEMP's responses to undesirable data trends for any of the environmental media), the FEMP will identify and implement appropriate actions internally and will document the decisions and resultant response actions in weekly teleconferences, in the IEMP mid-year reports and in the annual site environmental reports (Section 1.5.4).

The environmental media personnel are responsible for the ongoing review of media–specific monitoring data and the identification of any related environmental compliance issues. Similarly, the remediation projects are responsible for identifying any noncompliant situation within their project-specific monitoring program (e.g., stack emissions). The Closure Project Regulatory Management organization serves to independently review the compliance-related project-specific monitoring data and also facilitates reporting of this data. If the potential for an unacceptable future situation is identified, then the Closure Project Regulatory Management organization will facilitate the process of identifying alternatives for addressing the problem. The Closure Project Regulatory Management organization will also work closely with DOE to finalize the alternative decisions, assess their implications, and communicate the results of the evaluations as necessary to the FEMP's stakeholders and to EPA and OEPA.

1.5.3 <u>What are the General Criteria for the Decisions?</u>

The IEMP establishes, on a media-specific basis, the types of data and thresholds or regulatory limits required to support the management decisions described above. Each set of media-specific criteria are handled uniquely because of the varying media-specific locations where the regulatory criteria are applied. For example, the FEMP's most restrictive air monitoring criterion (the 10 millirem NESHAP requirements discussed in Section 6.0) is applied at locations at the site's fenceline, near where actual receptors are located. Other media-specific criteria, such as the FEMP's sediment control performance criteria, apply at the geographic boundaries of the individual projects themselves.

The media-specific sections of this plan review which monitoring requirements are to be met at the project boundaries (and thus fall under the domain of the individual projects) and which requirements fall outside the project boundaries and, because of their cumulative nature, fall under the domain of the IEMP. This responsibility distinction is facilitated by an in-depth ARAR review for each environmental media to identify applicable compliance locations and the resultant responsibilities for meeting them. Additionally, the media-specific sections define the criteria to be used to identify trends in the data that could indicate an imminent, unacceptable situation. Each of the media-specific sections specifies the frequency of the data evaluations to satisfy the FEMP's overall remediation planning and decision-making requirements. DOE will evaluate the FEMP's remediation data accordingly, and will report the results according to the approach summarized below.

1.5.4 How Will IEMP Decisions Be Communicated?

Each media section of this IEMP (Sections 3.0 through 7.0) present media-specific reporting components and Section 8.0 summarizes the overall reporting strategy for the IEMP. The data will be made available to the regulatory agencies on an ongoing basis in the form of electronic data files through the IEMP Data Information Site. Both IEMP mid-year data summaries and annual site environmental reports will be issued as part of the IEMP program. The reports will provide a reporting mechanism for both IEMP data and the project-specific environmental data gathered to meet project-specific regulatory compliance requirements pertinent to sitewide interpretation.

As indicated above, the majority of the management decisions made from IEMP data evaluations will be internally executed by the FEMP, as part of the FEMP's internal remediation planning and operations control practices. These internal decisions fall into two categories:

- Routine "process adjustment" decisions, which will be made by the FEMP's lead project organizations to react and respond to project-specific operating conditions and process-control objectives
- Major "project control" decisions, which may have more impact on the remediation project's continuing operations as discussed in Section 1.5.2, are the responsibility of the FEMP's Closure Project Regulatory Management organization (in collaboration with the affected project organizations) to respond to a pending adverse cumulative situation that may be developing.

The routine process adjustment decisions will not necessarily be reported as part of the IEMP mid-year or annual reporting cycles. These types of routine decisions will be maintained as part of the project organizations' daily operations logs and are considered to be a normal course of day-to-day practice to achieve project-specific operating objectives. The major project-control decisions that are the ultimate responsibility of the Closure Project Regulatory Management organization will be summarized in IEMP mid-year data summaries and in annual site environmental reports. The decision-reporting format will include: 1) a description of the pending adverse conditions; 2) the actions taken to respond to the situation; and 3) the mitigative results obtained. All such internal decisions will be made consistent with the FEMP's enforceable work plans and ARAR compliance requirements.

Three special circumstances were identified in Section 1.5.2 that require EPA and OEPA input before response actions are taken by FEMP management. For these three circumstances, EPA and OEPA concurrence will be sought before the actions are taken. Once a mutually agreeable decision is reached, the actions will be implemented. The decision process, actions taken, and results obtained will be summarized in the next available IEMP mid-year data summary report and/or in the annual site environmental report.

The IEMP mid-year data summaries and annual site environmental reports will be furnished to EPA and OEPA in accordance with the provisions summarized in Section 8.0. The IEMP annual site environmental reports will also be available for review by the FEMP's stakeholders at the Public Environmental Information Center and to selected stakeholders via mail.

If it becomes necessary to adjust the acceptable mix of projects underway at a particular time or curtail a planned activity in response to a pending unacceptable cumulative situation, then the Closure Project Regulatory Management organization will prioritize project activities and suspend non-priority activities as necessary to avoid a noncompliance. The Closure Project Regulatory Management organization's decision will be communicated to the EPA and OEPA via the weekly conference call agenda and report.

1.6 PROGRAM MODIFICATIONS AND REVISIONS

The IEMP will remain in place throughout the duration of the FEMP's remediation activities. Accordingly, the IEMP will function as a "living document" with periodic revisions as necessary to accommodate the initiation of new projects and the completion of others. As part of this living document concept, the IEMP, Revision 3, primarily focuses on the remediation activities forecasted for 2003 and 2004. The IEMP will be reviewed annually for necessary changes and revised every two years. Yearly reviews will focus on appropriateness of IEMP scope. The two-year revision cycle will provide for any change in program emphasis or allow for the scale back of monitoring activities deemed no longer appropriate based on project needs, accumulated results, or stakeholder concerns. If necessary, immediate, specific modifications to the IEMP will be made as data are reviewed. These immediate changes will be communicated to the agencies through the weekly conference calls and documented in the next annual review update or revision, as appropriate. The two-year revision cycle for the IEMP will also fulfill the formal commitment for revision of the FEMP's sitewide environmental monitoring program at least every three years as intended by DOE Order 5400.1.

TABLE 2-1
(Continued)

Operable Unit	Description	Remedy Overview[a]	Project Organization/Responsibilities
4	• Silos 1 and 2 (containing K-65 residues) • Silo 3 (containing cold metal oxides) • Silo 4 (empty and never used) • Decant tank system • Berms and soil within the operable unit boundary	Record of Decision Approved: December 1994 Record of Decision Amendment for Silos 1 and 2 Approved: July 2000 Silo 3: Explanation of Significant Differences Approved: March 1998 Removal of Silo 3 materials for off-site disposal (modification of the on-site treatment requirement is pending an amendment to the Record of Decision requiring regulatory approval). Removal of Silos 1 and 2 residues and decant sump tank sludges with on-site stabilization of materials, residues, and sludges followed by off-site disposal; demolition and decontamination, to the extent possible, of silos and remediation facilities. An Explanation of Significant Differences document is planned for regulatory review and approval to permit disposal of Silos 1 and 2 materials as 11e.(2) waste at permitted commercial disposal facility. Excavation of silos area contaminated soil above the FRLs with on-site disposal for contaminated soils and debris that meet the on-site disposal facility waste acceptance criteria; and site restoration. Concrete from Silos 1 and 2, and contaminated soil and debris that exceed the on-site disposal facility waste acceptance criteria will be disposed of off site.	Silos 1 and 2 Project is responsible for transfer of Silos 1 and 2 residues to temporary transfer tanks, treatment, and transport off site. Infrastructure and support systems such as roads and utilities will be completed to support the final remediation of the silos. Silo 3 Project is responsible for Silo 3 content removal, and transport off site. Soil and Disposal Facility Project is responsible for certification, excavation, and disposition of contaminated soil beneath the silos and for removal of subsurface structures (i.e., sub-grade silo decant system). The project is also responsible for design, construction, maintenance and closure of the on-site disposal facility that will contain Operable Unit 2 subunit wastes, Operable Unit 5 soil, and Operable Unit 3 debris. Aquifer Restoration and Wastewater Project is responsible for treating decontamination and other wastewaters during decontamination and demolition activities; each project is responsible for capturing and transporting remediation wastewater to the head works of the advanced wastewater treatment facility for treatment. Decontamination and Demolition Project is responsible for decontamination and dismantling of all Operable Unit 4 remediation facilities and associated above ground pipings.

TABLE 2-1
(Continued)

Operable Unit	Description	Remedy Overview[a]	Project Organization/Responsibilities
5	• Groundwater • Surface water and sediments • Soil not included in the definitions of Operable Units 1 through 4 • Flora and fauna	Record of Decision Approved: January 1996 An Explanation of Significant Differences document was approved on November 30, 2001 formally adopting EPA's Safe Drinking Water Act Maximum Contaminant Level for uranium of 30 µg/L as both the FRL for groundwater remediation and the uranium effluent discharge limit to the Great Miami River. Extraction of contaminated groundwater from the Great Miami Aquifer to meet FRLs at all affected areas of the aquifer. Treatment of contaminated groundwater, storm water, and wastewater to attain concentration and mass-based discharge limits and FRLs in the Great Miami River. Excavation of contaminated soil and sediment to meet FRLs. Excavation of contaminated soil containing perched water that presents an unacceptable threat, through contaminant migration, to the underlying aquifer. On-site disposal of contaminated soil and sediment that meet the on-site disposal facility waste acceptance criteria. Soil and sediment that exceed the waste acceptance criteria for the on-site disposal facility will be treated, when possible, to meet the on-site disposal facility waste acceptance criteria or will be disposed of at an off-site facility. Also includes site restoration, institutional controls, and post-remediation maintenance	<u>Aquifer Restoration Project</u> is responsible for designing, installing, and operating the extraction/re-injection systems for Great Miami Aquifer groundwater restoration This project is responsible for groundwater monitoring in the Great Miami Aquifer; reporting on the progress of aquifer restoration; designing, constructing, and operating all treated effluent discharge systems, and treating and discharging contaminated groundwater, storm water, and remediation wastewaters at the FEMP. This project is also responsible for operation, maintenance, and monitoring of the on-site disposal facility leachate collection system and leak detection system. <u>Soil and Disposal Facility Project</u> is responsible for certification of sitewide soil; excavation and disposition of contaminated soil, sediment, perched groundwater and at- and below-grade structures; and final site restoration. The project is also responsible for design, construction, maintenance and closure of the on-site disposal facility that will contain Operable Unit 2 subunit wastes, Operable Unit 5 soil, and Operable Unit 3 debris. <u>Waste Acceptance Operations</u> is responsible for reviewing Soils and Disposal Facility Project planning documents. This project is also responsible for oversight of field excavations, segregation on-site disposal facility material categories, and segregating prohibited items; completing field tracking logs; completing manifests for material bound for the on-site disposal facility; and compiling final records of soil and at- and below-grade debris placed in the on-site disposal facility. <u>Decontamination and Demolition Project</u> is responsible for decontamination and dismantling of Operable Unit 5 remediation facilities necessary through the site completion phase following the completion of aquifer remediation.

[a]Source of information is each operable unit's record of decision, remedial design documents, and the Fernald Closure Contract Performance Management Plan (DOE 2002).

The first aquifer remediation design was presented in the Operable Unit 5 Feasibility Study (DOE 1995b). The design consisted of 28 extraction wells pumping for 27 years. It is this design that is contained in the Operable Unit 5 Record of Decision (DOE 1996b). A commitment was also made in the Operable Unit 5 Record of Decision to pursue technological advances that might decrease the remediation time. A technology that was pursued was treated groundwater re-injection. Groundwater modeling was conducted to determine if adding re-injection wells to the remediation would facilitate a quicker cleanup. The groundwater modeling showed that a faster cleanup could be realized by using re-injection if several other actions were also realized. These other actions included:

- Other operable units completing their accelerated clean-up objectives so that surface access is available for aquifer remediation wells
- The accelerated removal of sources which will allow extraction wells to be located closer to the center of uranium plumes
- Modeled geochemical and hydraulic parameters being consistent with aquifer conditions.

An aquifer remediation design, which included re-injection was presented in the Baseline Remedial Strategy Report, Remedial Design for Aquifer Restoration (DOE 1997). This design called for 37 pumping wells and 10-re-injection wells. The predicted cleanup time was modeled at 10 years.

Although groundwater modeling showed that re-injection expedited the cleanup, the technology was unproven at the FEMP. Of concern was the cost that it would take to keep the wells operating in light of industry experience that they tend to plug. A demonstration was needed to prove that the re-injection wells could be operated efficiently at the FEMP. The decision was made to tie the demonstration into the remedy design presented in the Baseline Remedial Strategy Report. If successful the impact to the remedy would be immediate.

In the summer of 1998, the first wells for the aquifer remediation became operational and marked implementation of the aquifer remedy design presented in the Baseline Remedial Strategy Report. Implementation of the Baseline Remedial Strategy Report design included a groundwater re-injection demonstration that was conducted from September 2, 1998, to September 2, 1999. The evaluation of re-injection technology at the FEMP was sponsored by the DOE's Office of Science and Technology Subsurface Contaminants Focus Area, at the request of the FEMP. The re-injection demonstration was successful. Re-injection is currently being used in the aquifer remedy. Up until 2002, the system design presented in the Baseline Remedial Strategy Report was essentially being implemented, but as presented below, changes were implemented in 2002, and the remedy design continues to evolve.

3.4.2.2 The Modular Approach to Aquifer Restoration

Restoration of the Great Miami Aquifer is being accomplished by using a series of area-specific groundwater restoration modules and a centralized water treatment facility (Figure 3-1). The current design of the aquifer restoration system is modified from the design presented in the Baseline Remedial Strategy Report. Area-specific groundwater restoration modules in the current design include:

- The South Plume Module
- The Re-Injection Module
- The South Field Extraction (Phase I and II) Modules
- The Waste Storage Area (Phase I and II) Modules.

Area-specific modules are being brought on line as scheduled during the life of the remedy. In 2003 and 2004 the South Field Extraction (Phase I and II) Modules, South Plume Module, Waste Storage Area (Phase I) Module and the Re-Injection Module will all be operational. Figure 3-3 shows the location of the extraction and re-injection wells that comprise these modules.

The current aquifer remediation system evolved from the 10-year aquifer remedy design presented in the Baseline Remedial Strategy Report. Changes to the aquifer remedy design in the Waste Storage and Plant 6 Areas were based on findings and groundwater modeling results presented in the Conceptual Design for Remediation of the Great Miami Aquifer in the Waste Storage and Plant 6 Areas (DOE 2000a). Characterization efforts conducted in support of the design showed that the uranium plume in the Plant 6 area had dissipated. Therefore, an aquifer restoration module is no longer planned for the Plant 6 area, however, groundwater monitoring in the Plant 6 area will continue under the IEMP. Characterization efforts conducted in support of the design also showed that the uranium plume in the Waste Storage Area was smaller than what was characterized during the remedial investigation/feasibility study. Characterization efforts also showed that the Waste Storage Area uranium plume in the vicinity of the confluence of Paddys Run and the Pilot Plant Drainage Ditch needed to be redefined and extended to the east. In light of these findings, a new remedial system for the waste storage area was modeled. The number of wells needed in the design to remediate the Waste Storage Area went from 10 (Baseline Remedial Strategy Report design) down to 5 (modified design). Three of these began pumping in 2002. The details concerning this design are presented in the document Design for Remediation of the Great Miami Aquifer in the Waste Storage and Plant 6 Areas (DOE 2001a).

Based on findings presented in the Design for Remediation of the Great Miami Aquifer, South Field Phase (II) Module (DOE 2002a), the design of the South Field (Phase II) Module was also modified from what was presented in the Baseline Remedial Strategy Report. Characterization efforts conducted to support the design showed that uranium concentrations beneath western portions of the Southern Waste Units were much lower than in previous years. The lower concentrations were attributed to source removal, natural flow of clean groundwater from the west into the area, the continued flushing of clean recharge water through Paddys Run to the underlying aquifer, increased flushing of clean recharge water

The South Field Extraction Module (Phases I and II) consists of 13 extraction wells (33262, 31567, 31550, 31560, 31561, 31562, 32276, 32447, 32446, 33061, 33264, 33265, and 33266), one new re-injection well (33263), conversion of an existing extraction well (31563) to a re-injection well, and an injection basin. At the current time 10 of the extraction wells are operating, however, 13 extraction wells (31563 currently operating as an extraction well will be shut down shortly and converted to re-injection), two re-injection wells, and the injection basin are scheduled to be operational beginning in 2003.

The aquifer in this area is contaminated with a total uranium plume which resulted from infiltration of contamination through the South Field inactive flyash pile, Paddys Run, and the Storm Sewer Outfall Ditch. The sources of contamination in this area have been remediated by the Soil & Disposal Facility Project.

Restoration of the aquifer in the South Field area began in 1998, when 10 extraction wells (31550, 31560, 31561, 31562, 31563, 31564, 31565, 31566, 31567, and 32276) began pumping around the excavation area near the Storm Sewer Outfall Ditch (South Field Extraction [Phase I] Module). Extraction Wells 31566, 31564, and 31565 are no longer operating. Well 31566 was shut down to minimize the potential for pulling contamination into a region of the aquifer with finer grain sediment. Extraction Wells 31564 and 31565 were shut down in 2001 so that additional soil remediation could be conducted in the area. The module was expanded in 1999 and 2002. In 1999, Extraction Wells 32446 and 32447 were added, which began operating in 2000. Extraction well 33061 was subsequently added and became operational in 2002. Figure 3-3 shows the location of the extraction wells. The 4 new additional extraction wells, one new re-injection well, conversion of Extraction Well 31563 into a re-injection well, and injection pond will begin operation in 2003 in accordance to a South Field Phase II Design published in 2002.

The Re-Injection Module consists of Re-Injection Wells 33253, 33254, 33255, 22109, 22111, and 22240. Operation of the re-injection wells began in September 1998 as part of a one-year technology demonstration. Following completion of the re-injection demonstration in September of 1999, it was decided to incorporate re-injection technology into the aquifer remedy.

Injection Wells 33253 and 33254 were installed in 2002 to replace Re-Injection Wells 22107 and 22108. A new re-injection well (33255) was also installed in 2002. All three new re-injection wells should commence operations in late 2002.

The Waste Storage Area Phase I Module consists of three extraction wells (32761, 33062, and 33063). The wells became operational in May of 2002.

The groundwater-monitoring program is designed around the remediation modules presented above. For monitoring purposes, the aquifer is divided into five zones referred to as aquifer zones (Figure 3-4). These aquifer zones are used to evaluate the predicted performance (both individually and collectively) at the aquifer restoration modules. Three of the five aquifer zones (Aquifer Zones 1, 2 and 4) contain aquifer remediation modules. Aquifer Zone 0 (the 5th zone) is the area outside the other four aquifer zones. The location of the extraction or re-injection wells comprising the restoration modules is as follows:

- The South Plume Module is located in Aquifer Zone 4.
- The South Field Extraction (Phase I and II) Modules and the Re-Injection Module are located in Aquifer Zone 2.
- The Waste Storage Area Module is located in Aquifer Zone 1.

The 10-year, uranium-based restoration footprint is shown in Figure 3-4 so that its relationship to the aquifer zones can be seen.

3.4.2.3 Well Selection Criteria

Geologic and hydrogeologic properties, predicted and actual groundwater flow, and contaminant distribution within the Great Miami Aquifer (before and during remediation), serve as input to the design and modification of the IEMP groundwater monitoring network. Field measurements and computer simulations were conducted to support initial design efforts. Continued monitoring, and modeling (to support module design and changes) are used to assess the adequacy of the monitoring network. All available information is reviewed to select appropriate monitoring well locations. In general, the monitoring well locations for the IEMP are selected according to the following criteria:

- Monitor within the projected capture zone of the groundwater restoration operation unless an operational concern (i.e., the close proximity of the South Plume extraction wells to the Paddys Run Road Site plume) requires a monitoring location to be outside of the capture zone.

  Note: By 2003 most of the extraction wells and re-injection wells planned for the aquifer remedy will be operational. A few additional wells are planned for the Waste Storage Area. Additional wells may be installed if conditions indicate that they are needed. Also, pumping rates may change to optimize the operation through time. To be conservative, the monitoring well network will cover the capture zone predicted for all planned pumping wells, not just for the wells in service at the time that monitoring is taking place. This capture zone is not static, but may change over time to reflect new pumping and injection operations. Modeling is currently underway to determine a new capture zone, following the finalization of a new module design for the Waste Storage Area and South Field Phase II Area, and further evaluation of the off-property South Plume area. The modeling work (and new capture zone) will be reported in an addendum to the OU5 Baseline Remedial Strategy Report. Based on results of this work, the network design presented for 2003 and 2004 may need to be slightly modified, but no changes are anticipated at this time.

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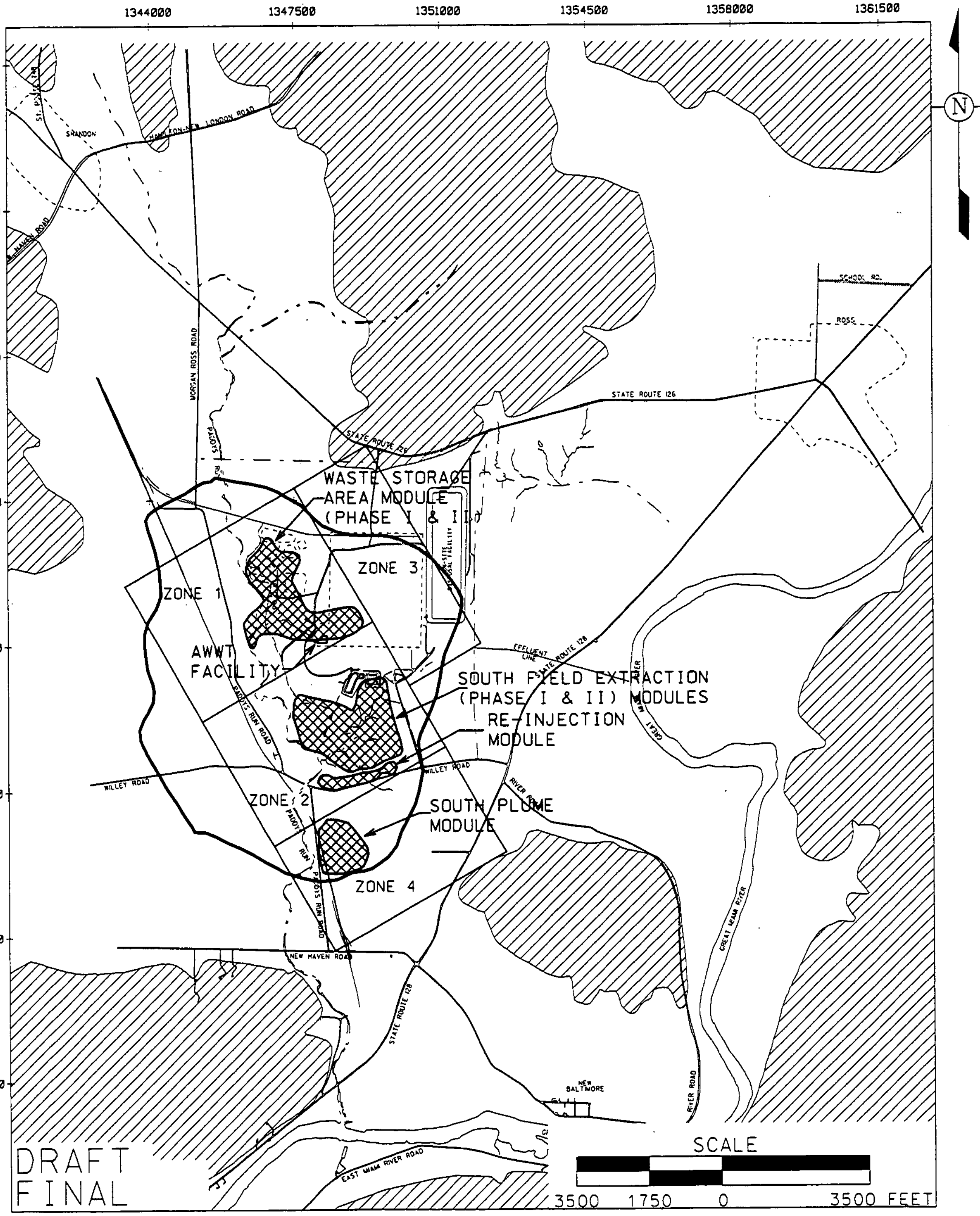

STATE PLANAR COORDINATE SYSTEM 1983

03-OCT-2002

LEGEND:

- FEMP BOUNDARY
- 10-YEAR, URANIUM-BASED RESTORATION FOOTPRINT
- BEDROCK HIGHS
- GEOGRAPHIC AREAS WITHIN WHICH EXTRACTION AND/OR RE-INJECTION WELLS ARE PLANNED

ZONE 0 CONSISTS OF ALL AREAS OUTSIDE ZONES 1, 2, 3, AND 4.

FIGURE 3-4. GROUNDWATER AQUIFER ZONES AND AQUIFER RESTORATION FOOTPRINT

- Use existing monitoring wells and avoid installing new monitoring wells until determined necessary based on operational knowledge, which will be used to help select new locations.

  Note: In 2001, nine new monitoring wells were installed in the Waste Storage area module to provide better monitoring coverage of the extraction wells near the Pilot Plant Drainage Ditch. In 2002, 26 new monitoring wells were installed in the South Field area to provide better monitoring coverage of the extraction and re-injection wells in the South Field. The Project Specific Plan covering the new wells in the South Field was titled, Project Specific Plan for the Installation of the South Field Phase II Module Extraction/Re-Injection Wells and Additional South Field Monitoring Wells" (DOE 2002). The strategy is to have a network that provides coverage on each side (surrounding) of an extraction/re-injection well.

- Provide adequate areal coverage across each remediation module area

- Include monitoring wells which are needed to meet site-specific monitoring commitments

- Avoid selecting monitoring well locations which would interfere with surface remediation activities such as soil excavations.

  Note: This criterion is becoming less of a concern because most of the planned monitoring wells are already in place. At issue though, is the loss of monitoring wells should excavation activities expand into areas that contain existing monitoring wells. It is anticipated that some monitoring wells in the current network will need to be plugged and abandoned to make way for surface operations, but all efforts will be made to keep existing wells if possible. If wells are lost due to surface operations, replacement wells will be installed, if deemed appropriate at the time.

- Select monitoring well locations that will provide data needed to determine if groundwater model predictions are being achieved.

- Select monitoring well locations in consideration of landowner concerns. In the off-property portion of the South Plume, landowner access concerns have and will continue to have a bearing on the location and number of monitoring wells in that area. Generally, location of monitoring wells is limited to peripheral areas along the edges of the farm fields. This monitoring well limitation is being addressed through supplemental use of direct push sampling that can be conducted during the times of the year when the fields are not being used for crops.

During 2003 and 2004, 148 wells at the FEMP will be monitored as identified in subsequent subsections.

3.4.2.4 Constituent Selection Criteria

The groundwater sampling constituent selection criteria are based on evaluation of the nearly five years of groundwater data that have been collected since inception of the IEMP. Rationale and justification for the revision are provided in Appendix A. The following is a brief overview.

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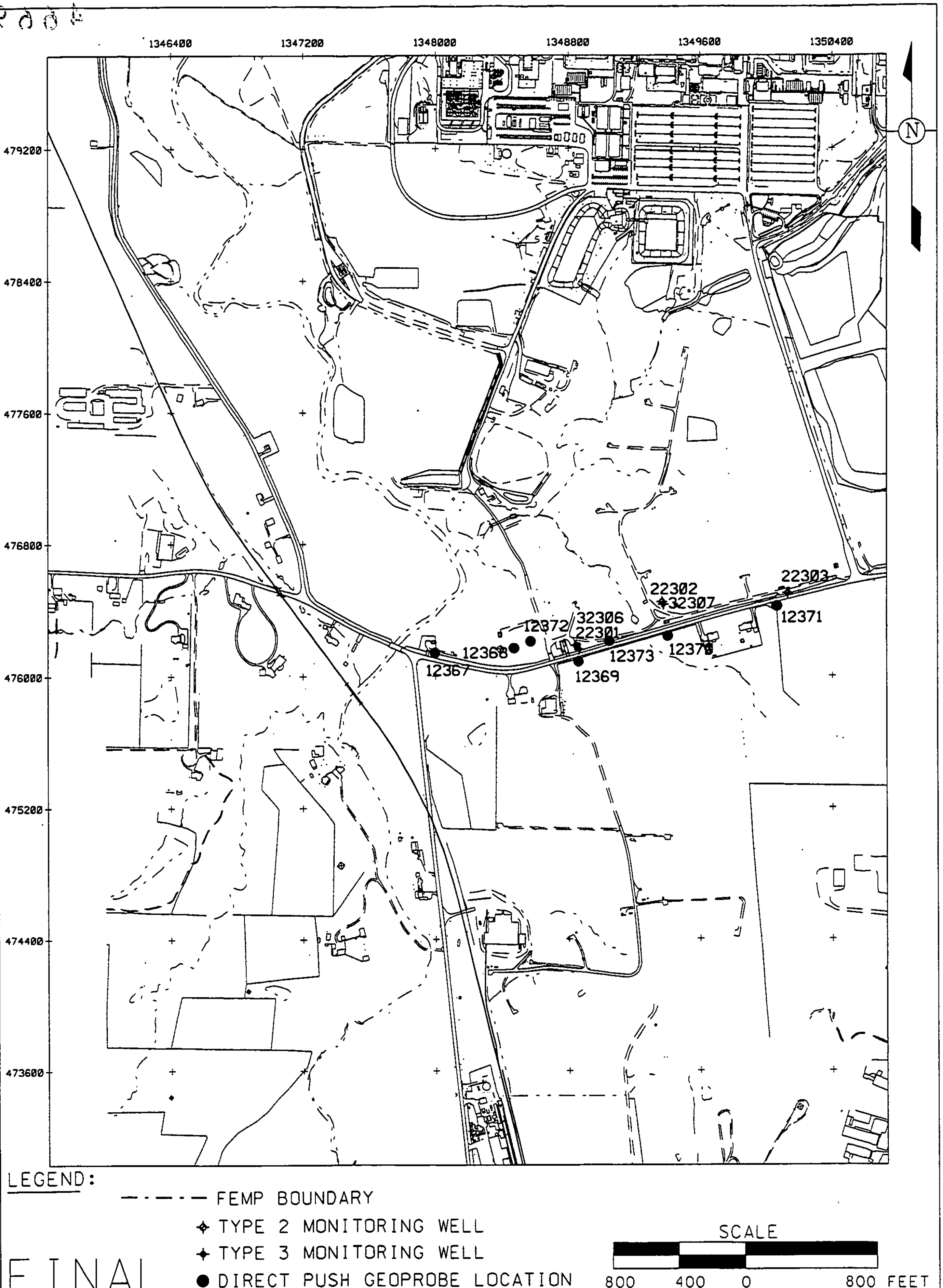

STATE PLANAR COORDINATE SYSTEM 1983

30-DEC-2002

FINAL

FIGURE 3-7. RE-INJECTION MODULE MONITORING WELLS AND DIRECT PUSH SAMPLING LOCATIONS

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The screens in these observation wells are located at approximately the same elevation depth that re-injection will be occurring at in 2003 and 2004. This activity coupled with the continued collection of Eh-pH data (discussed above) should be sufficient to document whether or not chromium VI is present in the aquifer as a result of re-injection.

3.6.2.3 Waste Storage Area Monitoring

The Waste Storage Area is located in Aquifer Zone 1 (Figure 3-4) and contains three total uranium plumes that have been targeted for restoration (Figure 3-2). Three extraction wells (32761, 33062, and 33063) will be operating in the Waste Storage Area in 2003 and 2004. Figure 3-3 shows the locations of these three wells.

In addition to the monitoring wells being sampled in the Waste Storage Area for total uranium only (See Section 3.6.2.1), the seven wells listed below will also be sampled semi-annually. Figure 3-6 shows the locations of these seven wells.

List of Seven Monitoring Wells to be monitored semiannually
In the Waste Storage Area for Constituents listed below

2010	2037	2648	2649	2821
3009	3821			

The seven wells listed above will be sampled for the constituents listed in the table below. The rational for the selection of these wells and these constituents is presented in Section 3.4 and Appendix A.

WASTE STORAGE AREA MONITORING TABLE
SEMI-ANNUAL SAMPLING FREQUENCY

General Chemistry	Inorganic	Radionuclide	Organic
Nitrate/Nitrite	Manganese	Technetium-99	Carbon Disulfide
	Molybdenum	Total Uranium	Trichloroethene

3.6.2.4 Property/Plume Boundary Monitoring

The focus of the Property/Plume Boundary Groundwater Monitoring activity is to detect and assess potential changes in groundwater conditions along the eastern FEMP property boundary and downgradient of the leading edge of the 30 μg/L total uranium plume south of the FEMP Property.

In 2003 and 2004, monitoring will be conducted along the property boundary and downgradient uranium plume boundary for FRL exceedances, and the influence, or lack thereof, that pumping is having on the Paddys Run Road Site Plume will be documented. Monitoring in 2003 and 2004 will also reduce redundancy with On-Site Disposal Facility monitoring.

Property/Plume Boundary Monitoring for FRL Exceedances

Twenty-seven monitoring wells along the eastern property boundary, and the leading edge of the off-site total uranium plume (see table below) will be sampled semi-annually. Figure 3-6 is a map showing the locations of the wells.

PROPERTY/PLUME BOUNDARY MONITORING WELLS TO BE MONITORED FOR FRL EXCEEDANCES ONLY

2070	2093	2398	2426	2429
2430	2431	2432	2733	3067
3070	3093	3398	3424	3426
3429	3431	3432	3733	4398
21063	31217	22204	22205	22208
22198	22199			

The twenty-seven monitoring wells will be sampled semi-annually for the constituents listed below. These constituents have all had FRL exceedances. The rational for the selection of these constituents and the monitoring schedule are presented in Section 3.4 and Appendix A. Once every five years, the following type-4 monitoring wells (4067, 4424, 4426, 4432, and 41217) will also be sampled for the constituents listed below. The next sampling is scheduled for 2006.

Five of the 27 monitoring wells (22204, 22205, 22208, 22198, and 22199) will be sampled for On-Site Disposal Facility constituents at the same time they are being sampled for Property/Plume boundary constituents. The data collected will then be used to satisfy both needs. The On-Site Disposal Facility monitoring wells will continue to be sampled quarterly as specified in the On-Site Disposal Facility Groundwater/Leak Detection and Leak Monitoring Plan (DOE 1997c).

PROPERTY PLUME BOUNDARY MONITORING TABLE FOR FRL EXCEEDANCES SEMI-ANNUAL SAMPLING FREQUENCY

General Chemistry	Inorganic	Radionuclide	Organic
Fluoride	Antimony	Total Uranium	NA
	Arsenic		
	Lead		
	Manganese		
	Nickel		
	Zinc		

Property/Plume Boundary Monitoring for Paddys Run Road Site Constituents

Groundwater is being pumped from the aquifer immediately north of the Paddys Run Road Site (Extraction Wells 3924, 3925, 3926, and 3927); it remains important to document the influence, or lack thereof, that the pumping is having on the Paddys Run Road Site plume. In 2003 and 2004 groundwater samples will be collected semi-annually from 11 monitoring wells. The eleven wells are tabulated below.

2128	2625	2636	2898	2899
2900	3128	3636	3898	3899
3900				

These 11 wells will be analyzed for Paddys Run Road Site constituents as well as for IEMP FRL exceedance constituents. The Paddys Run Road Site constituent list used in 2001 and 2002 will be carried over into 2003 and 2004. The constituent list presented below represents the constituents to be monitored.

PROPERTY PLUME BOUNDARY MONITORING TABLE FOR FRL EXCEEDANCES AND PRRS CONSTITUENTS SEMI-ANNUAL SAMPLING FREQUENCY

General Chemistry	Inorganic	Radionuclide	Organic
Fluoride	Antimony	Total Uranium	Benzene
Phosphorous	Arsenic		Ethyl benzene
	Lead		Isopropyl benzene
	Manganese		Toluene
	Nickel		Total Xylene
	Potassium		
	Sodium		
	Zinc		

If pumping rates of wells in the South Plume Module are increased above rates established in 1998, then arsenic sampling will be conducted weekly in Monitoring Wells 2128, 2625, 2636, 2900, and in Extraction Wells 3924, and 3925. The arsenic sampling will be used to determine if the increased pumping rates have adversely impacted the Paddys Run Road Site plume. The weekly sampling will be done for a minimum of three weeks after a pumping rate increase and if no changes in arsenic concentration trends are observed, the increased arsenic sampling will be discontinued. Figure 3-6 identifies the locations of these monitoring wells.

Since modeling was conducted for the remedial investigation/feasibility study and Baseline Remedial Strategy Report, the model has undergone several changes in order to improve its capability for making water level and uranium concentration predictions. DOE has transitioned from the Sandia Waste Isolation Flow and Transport (SWIFT) groundwater modeling code to the Variably Saturated Analysis Model in 3-Dimensions (VAM3D) modeling code for all site groundwater modeling operations. This transition has been documented in detail in Development and Verification of VAM3DF, a Numerical Flow and Transport Modeling Code (HydroGeologic prepared for Fluor Daniel Fernald, 1998).

The groundwater modeling grid used in the SWIFT model was retained for the VAM3D model. However, vertical discretization of the model was increased in the VAM3D model to 12 vertical layers instead of the six layers used in the SWIFT model.

The groundwater model was re-calibrated for flow to address observed changes in water level conditions and to address seasonal changes in water levels prior to it being used to support the design of the Waste Storage Area Module in 2001 and South Field Phase II Module in 2002. The 12-layer VAM3D model was re-calibrated to current groundwater elevations in May 2000 with calibration activities detailed in Great Miami Aquifer VAM3D Flow Model Re-Calibration (DOE 2000c). Because of significant seasonal changes in Great Miami Aquifer groundwater elevations, three sets of steady state flow model boundary conditions were developed for the VAM3D model as a result of the re-calibration effort. These three steady state flow model boundary conditions correspond to nominal groundwater elevations, and minimum and maximum groundwater elevations observed during the wet and dry seasons of the year respectively. The wet and dry boundary condition data sets will be used in future groundwater modeling activities to predict aquifer remedy performance under those conditions.

DOE is currently investigating the application of Data Fusion Modeling (DFM) to site groundwater modeling activities. DFM is an advanced and computationally intensive groundwater modeling methodology. To facilitate the application of DFM, a local VAM3D ZOOM model was designed covering a smaller area than the 12-layer VAM3D model. The VAM3D ZOOM model contains 14 layers and covers an area just large enough to encompass the total uranium plume and the extraction/re-injection wells in the aquifer remedy. The VAM3D ZOOM model design is documented in Integration of Data Fusion Modeling (DFM) with VAM3DF Contaminant Transport Code (HydroGeoLogic prepared for Fluor Fernald, 2000).

Because the ZOOM model boundaries are near some of the aquifer remedy extraction wells, ZOOM model steady state flow boundaries must be derived from the larger 12-layer VAM3D model to avoid model boundary effects impacting flow model predictions of remedy performance. For all current and future operational flow modeling activities, aquifer remedy pumping/re-injection scenarios are first run to steady state in the large 12-layer VAM3D model then ZOOM model boundary values are derived from the output of the 12-layer flow model run. This technique is described in more detail in Design for Remediation of the Great Miami Aquifer South Field Phase II Module (DOE 2002a).

It is understood that the groundwater model may need to be re-calibrated in the future for flow if measured water levels and model predictions are not adequate for managing the remedy. Should future flow model calibration efforts be performed the large 12-layer VAM3D model will be re-calibrated to observed groundwater elevation data then VAM3D ZOOM model boundary conditions will be derived from the large 12-layer VAM3D model.

Calibration standards will be the same as those used to calibrate the Sandia Waste Isolation Flow and Transport (SWIFT) model.

The basic strategy for assessing flow predictions will be as follows:

- Model predicted water level values will be compared to actual field measured values. The decision to re-calibrate the groundwater model will be based on how close the model predictions are to field measured values.

- The difference between the maximum and minimum measured groundwater elevation over time will be used to define a water level elevation range for a particular well. The water level range is the result of seasonal variations and long term water level trends within the aquifer. A range of water levels over time has been established for each water level monitoring well identified in the IEMP.

- If the difference between measured elevations and modeled predictions is greater than five feet for more than one-third of the monitoring wells within the capture zone of the extraction system, or for a significant local area of the model domain, then the need to implement model recalibration for the affected area of the model will be evaluated. All relevant groundwater data acquired since the previous flow model calibration will be considered in future flow model calibrations. Comparisons will recognize that modeled predictions represent average conditions within a model block and monitoring wells are not usually located at the center of a model block. One solution might be to compare the surrounding eight model blocks to the actual measured elevation.

The current groundwater model has been adjusted from previous models to provide better point concentration predictions, but at the time of this writing, the predictions that have been made lack sufficient field measurements to determine if the model improvements were successful. In the past, point concentration predictions made using the SWIFT Model for the remedial investigation/feasibility study and Baseline Remedial Strategy Report modeling designs have not matched actual field measured concentrations as well as was hoped. For instance, measured concentrations in the South Plume during 2001 are higher than what were predicted in the Baseline Remedial Strategy Report. This could indicate that the model is not capable of making realistic predictions, or as the sensitivity analysis reported in Appendix A of the Baseline Remedial Strategy Report indicates, longer pumping times are required.

Several adjustments have been made to the model under the assumption that the model is not making realistic point concentration predictions. Initial conditions were reloaded. Earlier model runs assigned the maximum uranium concentration to a model layer, now the average concentration is assigned instead. The number of layers in the model has been increased from 6 to 14 in order to provide better resolution. Six layers were used in the SWIFT Model to support design of the Feasibility Study and Baseline Remedial Strategy Report Aquifer Remediation Systems. The VAM-3D model replaced the SWIFT model for design of the Waste Storage Area Module. The VAM-3D model had 12 layers. The ZOOM model replaced the VAM-3D model for design of the South Field Phase II Module. The ZOOM model has 14 layers.

Waste Storage Area wells have only been in operation since May of 2002. The South Field Phase II wells are not scheduled to be operational until 2003. Therefore no data is available to compare to the point concentration predictions modeled by the VAM-3D or ZOOM Models. In addition to adjusting the model as described above, a study to determine how uranium is sorbed and partitioned on Great Miami Aquifer Sediments is underway. It is hoped that information from this study can be applied to improve model predictions of point concentrations. Model-predicted contaminant concentration profiles over time will be compared to field measured concentrations. Concentration data collected in the field will be trended to determine if FRL concentrations will be achieved within the time frame predicted by the model. Differences between model predicted concentrations and measured concentrations may be the result of inaccurate transport parameter values and/or operational conditions (i.e., pumping and re-injection rates) not being the same as used in the model.

The mass of uranium removed from the aquifer will be compared to what was predicted by the groundwater model to determine how close the predictions were. Field data will be used to determine when pumping adjustments need to be evaluated. The future effect of pumping adjustments will be evaluated using the groundwater model.

Assess the Impact that the Aquifer Restoration is Having on the Paddys Run Road Site Plume

As was done from 1997 to 2002, concentration data collected in 2003 and 2004 for key Paddys Run Road Site constituents will be evaluated using trend analysis. Water level maps will be produced to determine where capture is occurring due to pumping in the South Plume Module.

Adequately Address Community Concerns

The IEMP fulfills the informational needs of the Fernald community by preparing groundwater environmental results in annual site environmental reports. DOE makes these reports available to the public at the Public Environmental Information Center. Comments received over the life of the IEMP program regarding the IEMP groundwater program will be considered in future revisions to the IEMP.

Overall Aquifer Restoration Decision-Making Process

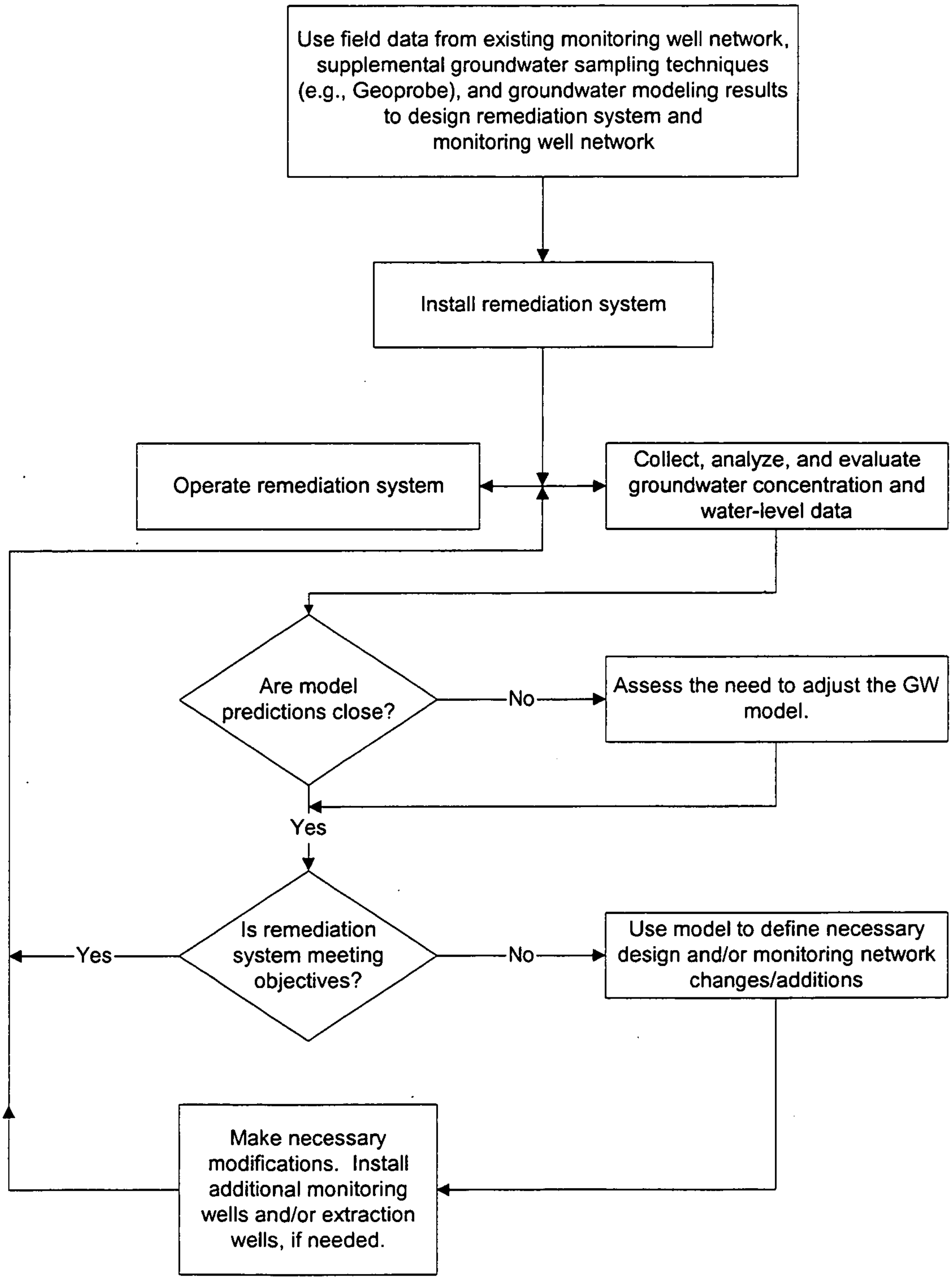
Figure 3-10 illustrates the overall framework for the decision-making process for 2003 and 2004. Groundwater monitoring will be conducted during aquifer remediation. If it is determined that program expectations for 2003 and 2004 are not being met, then the design and operation of the aquifer restoration system will be evaluated to determine if a change needs to be implemented. A change to the operation of the aquifer restoration system would be implemented through the Operations and Maintenance Master Plan for the Aquifer Restoration and Wastewater Treatment Project (DOE 1997d). A groundwater monitoring change, if found to be necessary, would be implemented through the IEMP. If additional characterization data are needed above and beyond the current scope of the IEMP, (e.g., to determine the nature of a newly detected FRL exceedance, or to support the design of a new extraction or re-injection well), then a separate sampling plan will be prepared. Additional sampling activities may utilize other sampling techniques, such as a direct-push sampling tool, which has been successfully used at the FEMP to obtain groundwater samples without the use of a permanent monitoring well.

In the past, groundwater data have been presented and evaluated in the following manner:

- Concentration versus time plots for specific constituents
- Tables identifying wells with constituents above FRL concentrations
- Mann-Kendall trend analyses for specific constituents
- Concentration contour maps.

Through the lifetime of the aquifer restoration, large quantities of data will be collected and evaluated. In order to evaluate the results of the sampling, the data collected for the IEMP will be presented and evaluated using the above formats. The findings of data evaluations will be shared with project personnel. The EPA and OEPA have identified that this is a successful method of evaluating and presenting the data.

FIGURE 3-10
AQUIFER RESTORATION DECISION-MAKING PROCESS



Ultimately, the IEMP will be used to document the approach for determining when various modules can be removed from service, once remedial action objectives for the Great Miami Aquifer (provided in the Operable Unit 5 Record of Decision) are achieved. It is too early to begin the process of removing modules from the aquifer restoration system during 2003 and 2004. Therefore, methods for verifying remedy completion are not included in this revision of the IEMP. However, the IEMP will later serve as the vehicle for verifying the completion of the aquifer restoration. The sampling and data evaluation methods which will be used to verify restoration will be presented in future revisions of the IEMP

3.7.2 Reporting

The IEMP groundwater program data will be reported on the IEMP Data Information Site. Mid-year data summary reports and annual site environmental reports will be produced. In addition, groundwater data that support the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring plan (DOE 1997c) will also be provided in the same manner. Additional information on IEMP data reporting is provided in Section 8.3.3.

Data pertaining to the groundwater program will be provided on the IEMP Data Information Site. The data will be in the format of searchable data sets and/or downloadable data files. This site will be updated every two to four weeks, as data become available.

The IEMP mid-year data summary will supplement the IEMP Data Information Site by providing a brief summary of the data added to the site during the reporting period and identifying notable results and/or events related to that data. The IEMP mid-year data summaries will be submitted in November of each year.

The IEMP annual site environmental reports will be issued each June for the previous year. The comprehensive report will discuss a year of IEMP data previously reported on the IEMP Data Information Site and in the mid-year data summary. The IEMP annual site environmental reports will include the following:

Operational Assessment

- The "set point" pumping rate(s) for each extraction well during the year
- The "set point" re-injection rate(s) for each re-injection well and module during the year
- The uranium removal rate of individual wells

- Extraction and re-injection well total hours of operation during the year
- The volume of treated groundwater
- Extraction or re-injection well operating time expressed as a percentage of total available operating time
- The volume of water pumped from each extraction well during the year
- The volume of water re-injected into each re-injection well during the year
- The net water balance, based on the amount of water pumped and the amount of water re-injected during the last quarter
- Total pounds of uranium removed during the year
- Total pounds of uranium removed from the aquifer since the start of remediation
- The maximum, minimum, and average uranium concentration sent to treatment during the last year
- The monthly average uranium concentration in water discharged to the Great Miami River during the year
- Pumping rate figures for each extraction and re-injection well.

<u>Aquifer Conditions</u>

- The area of capture during the year
- A description of the geometry of the total uranium plume during the year
- The effect that restoration had (i.e., pumping) on the Paddys Run Road Site plume during the year
- The status of non-uranium FRL exceedances, including any newly detected FRL exceedances
- Identification of any new areas of FRL exceedances
- A comparison of groundwater restoration performance with respect to model predictions established in the Baseline Remedial Strategy Report
- Any changes that may have been made to the operation or design of the system to maintain the restoration on schedule as predicted in the Baseline Remedial Strategy Report.

<u>Data that Support the On-Site Disposal Facility Groundwater/Leak Detection and Leachate Monitoring Plan</u>

- Status information pertaining to the on-site disposal facility wells along with baseline data summaries
- Leachate volumes and concentrations from the leachate collection system and from the leak detection system for the on-site disposal facility
- Results of quarterly groundwater sampling initiated after waste is placed in a cell of the on-site disposal facility.

In addition, the IEMP annual site environmental report will include trend analysis of the data collected from the on-site disposal facility.

Because the IEMP is a "living document", annual reviews and two-year revisions have been instituted. The annual review cycle provides the mechanism for identifying and initiating any groundwater program modifications (i.e., changes in constituents, locations, or frequencies) that are necessary to align the IEMP with the current mix of near-term remediation activities. Any program modifications that may be warranted prior to the annual review would be communicated to EPA and OEPA.

TABLE 4-3
(Continued)

Location	Constituent[a]	IEMP Characterization Requirements (reason for selection)[b,c]	NPDES Requirements[c]	OU5 ROD/FFCA[c] Requirements
PF 4001 (Parshall Flume - Treated Effluent)	**General Chemistry:**			
	Ammonia	-	3/Week[g]	-
	Carbonaceous biochemical oxygen demand	-	2/Week	-
	Total residual chlorine	-	2/Week	-
	Oil and grease	-	2/Week	-
	Total suspended solids	-	Daily	-
	Inorganics:			
	Cadmium	Quarterly (S)	3/Week	-
	Chromium, Total	-	3/Week	-
	Cobalt	-	2/Week	-
	Copper	-	3/Week	-
	Cyanide	Quarterly (M)	3/Week	-
	Lead	-	3/Week	-
	Manganese	-	2/Week	-
	Mercury	Quarterly (M)	Monthly	-
	Nickel	-	3/Week	-
	Silver	Quarterly (M)	3/Week	-
	Zinc	-	3/Week	-
	Radionuclides:			
	Radium-226	Quarterly (M)	-	-
	Radium-228	-	-	Monthly
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M)	-	Monthly
	Uranium, Total	Quarterly (PC, M)	-	Daily
	Pesticides/PCBs:			
	Toxaphene	-	Monthly	-
	Semi-Volatiles:			
	Benzidene	-	Monthly	-
	Pentachlorophenol	-	Quarterly	-
	Volatiles:			
	Trichloroethene	-	Monthly	-
	Other:			
	2,3,7,8-Tetrachlorodibenzo-p-dioxin	-	Quarterly	-
	Flow Rate	-	Daily	-
SWRB 4002O[h] (Storm Water Retention Basin)	**General Chemistry:**			
	Total residual chlorine	-	Daily	-
	Total suspended solids	-	Daily	-
	Inorganics:			
	Beryllium	Quarterly (S)	-	-
	Cadmium	Quarterly (S)	-	-
	Copper	-	Monthly	-
	Cyanide	Quarterly (M, S)	-	-
	Manganese	Quarterly (S)	-	-
	Mercury	Quarterly (M, S)	Monthly	-
	Radionuclides:			
	Radium-226	Quarterly (M)	-	-
	Radium-228	Quarterly (S)	-	-
	Strontium-90	Quarterly (M)	-	-
	Technetium-99	Quarterly (M, S)	-	-
	Uranium, Total	Quarterly (PC, M)	-	Daily
	Other:			
	Flow rate	-	Daily	-

TABLE 4-3
(Continued)

Location	Constituent[a]	IEMP Characterization Requirements (reason for selection)[b,c]	NPDES Requirements[c]	OU5 ROD/FFCA[c] Requirements
SWRB 4002B (Treatment Bypass)	**Radionuclide:**			
	Uranium, Total	-	-	Daily during bypass
STRM 4003, STRM 4004[i] STRM 4005, STRM 4006 (Drainages to Paddys Run)	**General Chemistry:**			
	Total suspended solids	-	Semiannually	-
	Total residual chlorine (4003, 4005, 4006)	-	Semiannually	-
	Inorganics:			
	Copper (4003, 4004, 4006)	-	Semiannually	-
	Lead (4004, 4005, 4006)	-	Semiannually	-
	Mercury	-	Semiannually	-
	Silver	-	Semiannually	-
	Radionuclides:			
	Uranium, Total	Quarterly (PC, M, S)	-	-
	Other:			
	Fecal coliform	-	Semiannually	-
	Flow Rate	-	Semiannually	-
STP 4601 (Sewage Treatment Plant Effluent)	**General Chemistry:**			
	Carbonaceous biochemical oxygen demand	-	2/Week	-
	Ammonia	-	Every two weeks	-
	Total suspended solids	-	2/Week	-
	Other:			
	Fecal coliform	-	Weekly (May-Oct)	-
	Flow Rate	-	Daily	-
SWR-4902 (Downstream of FEMP Effluent)	**General Chemistry:**			
	Ammonia	-	Quarterly	-
	Total Hardness	-	Quarterly	-
	Inorganics			
	Cadmium	-	Quarterly	-
	Chromium	-	Quarterly	-
	Cobalt	-	Quarterly	-
	Copper	-	Quarterly	-
	Lead	-	Quarterly	-
	Manganese	-	Quarterly	-
	Mercury	-	Quarterly	-
	Nickel	-	Quarterly	-
	Silver	-	Quarterly	-
	Zinc	-	Quarterly	-

[a]Field parameter readings, taken at each location, include temperature, specific conductance, pH, and dissolved oxygen.
[b]B = Background Evaluation; M = Based on Modeling; PC – Primary COC; S – Sporadic Exceedances of FRLs or BTVs; WP – Waste Pits Excavation Monitoring
[c]"-"indicates the constituent is not included in the sample program.
[d]Refers only to location SWR-01 (NPDES location SWR-4801); constituents sampled quarterly.
[e]Constituent being monitored during excavation of the waste pits to assess thorium releases as a whole.
[f]The basis for the "M" designation is because of the contribution from an upgradient location (i.e., SWP-02).
[g]Sampled twice a week in winter (November 1 through April 30).
[h]Constituents will be analyzed at each overflow event.
[i]New location STRM 4004A has been identified as an alternative sample location for STRM 4004. STRM 4004A will be sampled for the constituents if no flow is observed at STRM 4004 or is otherwise not accessible.

Treated Effluent Sampling

Treated effluent will be collected by means of flow-proportional samplers at the Parshall Flume and at the new sewage treatment plant (STP 4601). Storm water is also sampled from a bypass pipeline when storm water collected in the Storm Water Retention Basin is diverted from treatment during periods of heavy rainfall. Sampling will be conducted according to the following procedures:

Standard Operating Procedures

EW-0002	Chain of Custody/Request for Analysis Record for Sample Control
43-C-108	IEMP Surface Water Sampling
43-C-113	NPDES Sampling

After every 24 hours of operation, the collected liquid is removed from the automatic sampler to provide a daily flow-weighted sample of the treated effluent. A portion of each daily sample is analyzed to determine the estimate of total uranium discharged to the Great Miami River for the day. The Parshall Flume, the new sewage treatment plant, and Storm Water Retention Basin bypass samples will be analyzed for the constituents listed in Table 4-3 for the respective locations. Table 4-5 lists the sample preservative, volumes, container requirements, and analytical methods for each constituent.

4.5.2.2 Quality Control Sampling Requirements

Quality control samples will be taken according to the frequency recommended in the SCQ. These samples will be collected and analyzed in order to evaluate the possibility that some controllable practice, such as sampling technique, may be responsible for introducing bias in the project's analytical results. Quality control samples will be collected as outlined in Section 4.1.1 and Appendix A, Table 2-3 of the SCQ as follows:

- A duplicate sample shall be collected each quarter at a randomly selected sample location.
- Trip blanks will be prepared and placed in coolers containing samples for volatile organic compound analysis and shall accompany the samples from collection to receipt at the laboratory.

4.5.2.3 Decontamination

In general, decontamination of equipment is minimized because reusable equipment is not used during sample collection. However, if decontamination is required, then equipment will be cleaned between sample locations. The decontamination shall be Level II as referenced in Section K.11 of the SCQ. Sampling bailers used in sampling for mercury at NPDES Permit locations will be decontaminated at a contract laboratory.

4.5.2.4 Waste Dispositioning

Contact waste that is generated by the field technicians during field sampling activities are collected, maintained, and dispositioned, as necessary, depending upon the location of waste generation. Contact waste generated outside of radiological control areas will be placed in a clean trash dumpster. Contact waste generated within radiological control areas will be disposed of in a designated radiological contact waste container.

4.5.3 Change Control

Changes to the media-specific plan will be at the discretion of the project team leader. Prior to implementation of field changes, the project team leader or designee shall be informed of the proposed changes and circumstances substantiating the changes. Any changes to the media-specific plan must have written approval by the project team leader or designee, quality assurance representative, and the Field Manager prior to implementation. In accordance with Section 15.3 of the SCQ, the Variance/Field Change Notice form must be completed and approved within one week of the initial written approval. The Variance/Field Change Notice form shall be issued as controlled distribution to team members included in the field data package and become part of the project record. During biennial revisions to the IEMP, Variance/Field Change Notices will be incorporated to update the media-specific plan.

4.5.4 Health and Safety Considerations

The FEMP Health and Safety organization is responsible for the development and implementation of health and safety requirements for this media-specific plan. Hazards (physical, radiological, chemical, and biological) typically encountered by personnel when performing the specified fieldwork will be addressed during team briefings.

All involved personnel will receive adequate training to the health and safety requirements prior to implementation of the fieldwork required by this media-specific plan. Safety meetings will be conducted prior to beginning fieldwork to address specific health and safety issues. All Fluor Fernald employees and subcontractor personnel who will be performing field work required by this media-specific plan are required to have completed applicable training.

For areas that are subject to more restrictive radiological controls where the potential for exposure is greater, radiation work permits are necessary and will be obtained prior to the fieldwork being performed in those areas. A radiological control technician will be assigned to each field crew performing any activities in an area requiring a radiation work permit.

The project team leader will have full responsibility and authority for the implementation of this project-specific plan, in compliance with all regulatory specifications and sitewide programmatic requirements. Integration and coordination of all Media-Specific Plan activities defined herein with other project organizations is also a key responsibility. All changes to project activities must be approved by the project team leader or designee.

Health and safety is the responsibility of all individuals working on this project scope. Qualified health and safety specialists shall participate on the project team to provide radiation protection and industrial hygiene support, and to assist in preparing and obtaining all applicable permits. In addition, safety specialists shall periodically review and update the project-specific health and safety documents and operating procedures, conduct pertinent safety briefings, and assist in evaluation and resolution of all safety concerns.

Quality assurance specialists will participate on the project team, as necessary, to review project procedures and activities ensuring consistency with the requirements of the SCQ or other referenced standards, and to assist in evaluating and resolving all quality related concerns.

5.5.2 Sampling Program

Sediment samples will be collected on an annual basis, typically in the summer, from 16 locations within the Storm Sewer Outfall Ditch, Paddys Run, and the Great Miami River. Sampling is usually performed in the summer in order to take advantage of the abundance of fresh sediment deposited during flood conditions that commonly occur after the winter and spring seasons and to enable sampling during low-flow or dry conditions. Sampling at other times of the year is also acceptable although sample collection may be more difficult due to water flow. Figure 5-2 depicts the IEMP sediment sample locations. Table 5-2 includes a summary of the sample locations, constituents to be analyzed, and the design purposes. Table 5-3 summarizes the field sample collection information for each group of locations. Sample analysis will be performed at the on-site FEMP laboratory or a contract laboratory dependent on specific analyses required, laboratory capacity, turn-around time, and performance of the laboratory. The laboratories utilized for analytical testing must be approved by the FEMP in accordance with the criteria specified in Sections 3.1.5, 12.4, and Appendix E of the SCQ. These criteria include meeting the requirements for performance evaluation samples, pre-acceptance audits, performance audits, and an internal quality assurance program. A list of FEMP-approved laboratories and current status of each is maintained by the FEMP quality assurance organization.

TABLE 5-2

ANNUAL SEDIMENT SAMPLING PROGRAM DESIGN

Location	Constituent	Expectation
Paddys Run background (1 sample location - P1)	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	Establish range of background concentrations in Paddys Run
Paddys Run north of the Storm Sewer Outfall Ditch (5 sample locations - PN1, PN2, PN3, PN4, and PN5)	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	Measure the impact of surface water runoff from western portion of the site including the waste pits and K-65 Silos (Operable Units 1 and 4)
Paddys Run south of the Storm Sewer Outfall Ditch[a] (3 sample locations - PS1, PS2, and PS3)	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	Measure impact of surface water runoff from the site
Storm Sewer Outfall Ditch (5 sample locations - D1, D2, D3, D4, and D5)	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	Measure the impact of any overflows of the Storm Water Retention Basin, surface water runoff from the eastern portion of the site (certified) and residual contaminant concentrations from past releases
Great Miami River (1 sample location - G4)	Uranium, Total	Measure the impact of the site effluent
Great Miami River background (1 sample location - G2)	Uranium, Total	Establish range of background concentration in Great Miami River

[a]The constituents listed for Paddys Run South only apply to sediment location PS1. For the other two locations in Paddys Run South (PS2 and PS3), only total uranium will be analyzed.

TABLE 5-3

SEDIMENT SAMPLE ANALYTICAL REQUIREMENTS

Location	Number of Locations[a]	Sample Frequency	Constituent[b]	ASL[c]	Container	Holding Time	Preservative
Storm Sewer Outfall Ditch (D1, D2, D3, D4, and D5)	5	Annually	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Great Miami River (G4)	1	Annually	Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Paddys Run north of the Storm Sewer Outfall Ditch (PN1, PN2, PN3, PN4, and PN5)	5	Annually	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Paddys Run south of the Storm Sewer Outfall Ditch[d] (PS1, PS2, and PS3)	3	Annually	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Great Miami River background (G2)	1	Annually	Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Paddys Run background (P1)	1	Annually	Radium-226 Radium-228 Thorium-228 Thorium-230 Thorium-232 Uranium, Total	B	500 mL glass or plastic jar	6 months	None
Rinsate Sample	1	Annually	Uranium, Total	B	500 mL plastic jar	6 months	HNO_3 to pH<2

[a]The number of samples may vary depending on the availability of recently deposited sediment.
[b]Radionuclide analyses do not have standard methods; Appendix G of the SCQ provides performance specifications.
[c]A more conservative ASL may be required for laboratory data in order to meet required detection limits or in order to ensure data quality objectives.
[d]The constituents listed for Paddys Run South only apply to sediment location PS1. For the other two locations in Paddys Run South (PS2 and PS3), only total uranium will be analyzed.

5.5.2.1 Sampling Procedures

Sediment sampling is conducted in accordance with standard operating procedures referenced below. The procedures provide sampling instructions which incorporate the requirements outlined in the SCQ as follows:

Standard Operating Procedures	
ADM-02	Field Project Prerequisites
SMPL-01	Solids Sampling
SMPL-21	Collection of Field Quality Control Samples
EW-0002	Chain of Custody/Request for Analysis Record for Sample Control

Sitewide CERCLA Quality (SCQ) Assurance Project Plan	
Section 4	Quality Assurance Objectives
Section 5	Field Activities
Section 6	Sampling Requirements
Section 7	Sample Custody
Section 8	Calibration Procedures and Frequency
Appendix I	Field Calibration Requirements
Appendix J	Field Activity Methods
Appendix K	Sampling Methods

Project-specific sampling considerations are outlined below:

- Only recently deposited surface sediment shall be collected, typically from deposition locations such as slow flow-rate areas (e.g., obstructions in the stream bed that allow sediment to be deposited).
- Samples shall be collected from the top two inches and consist of fine-grained material.
- Sample collection shall begin at the farthest downstream location and proceed upstream.
- Any non-sediment materials shall be discarded from the sample, any free water drained, and placed in the sample container.

The exact locations of the sediment sample points are approximate and may change from year to year, based on where stream flow has deposited sufficient material for sampling. Sediment samples are collected and analyzed according to Table 5-3.

5.5.2.2 Quality Control Sampling Requirements

Quality control samples will be taken according to the frequency recommended in Appendix A, Table 2-3 of the SCQ and detailed below. These samples will be collected and analyzed to evaluate the possibility that some controllable practice, such as decontamination, sampling or analytical technique, may be responsible for introducing bias in the analytical results. Approximately one field duplicate will be collected for every

20 samples. One rinsate sample for total uranium will also be collected following decontamination of the sediment sampling scoop or sampling device.

The State of Ohio, through its Agreement in Principle with DOE, empowers the Ohio Environmental Protection Agency (OEPA) to take samples that are independent of the split-sampling program. In addition, sediment samples may be split annually. These samples further supplement the quality assurance program by providing a means to evaluate comparability between laboratories. Samples collected with OEPA are analyzed for the same constituents as those established in Table 5-3 for the location being sampled.

5.5.2.3 Decontamination

Decontamination of sampling equipment will be performed between sample locations to prevent the introduction of contaminants or cross-contamination into the sampling process. The decontamination shall be Level II as referenced in Section K.11 of the SCQ.

5.5.2.4 Waste Dispositioning

Contact wastes that are generated by the field technicians during field sampling activities are collected, maintained, and dispositioned depending upon the location of waste generation (i.e., former production area or off site). Contact waste generated outside of radiological control areas will be placed in a clean trash dumpster. Contact waste generated within radiological control areas will be disposed of in a designated radiological contact waste container.

5.5.3 Change Control

Changes to the Media-Specific Plan will be at the discretion of the project team leader. Prior to implementation of field changes, the project team leader or designee shall be informed of the proposed changes and circumstances substantiating the changes. Any changes to the Media-Specific Plan must have written approval by the project team leader or designee, quality assurance representative, and the Project Lead prior to implementation. In accordance with Section 15.3 of the SCQ, the Variance/Field Change Notice form must be completed and approved within one week of the initial written approval. The Variance/Field Change Notice form shall be issued as controlled distribution to team members, included in the field data package and become part of the project record. During biennial revisions to the IEMP, Variance/Field Change Notices will be incorporated to update the Media-Specific Plan.

5.5.4 Health and Safety Considerations

The FEMP Health and Safety organization is responsible for the development and implementation of health and safety requirements for this media-specific plan. Hazards (physical, radiological, chemical, and biological) typically encountered by personnel when performing the specified field work will be addressed during team briefings.

All involved personnel will receive adequate training to the health and safety requirements prior to implementation of the field work required by this media-specific plan. Safety meetings will be conducted prior to beginning field work to address specific health and safety issues. All Fluor Fernald employees and subcontractor personnel who will be performing field work required by this media-specific plan are required to have completed applicable training.

For areas that are subject to more restrictive radiological controls where the potential for exposure is greater, radiation work permits are necessary and will be obtained prior to the field work being performed in those areas. A radiological control technician will be assigned to each field crew performing any activities in an area requiring a radiation work permit.

5.5.5 Data Management

Field documentation and analytical results will meet the IEMP data reporting and quality objectives, conform with appropriate sections and appendices of the SCQ, and comply with specific FEMP procedures, such as the Data Validation Procedure, EW-0010.

Data documentation and validation requirements for data collected in 2003 and 2004 for the IEMP generally fall into two categories depending upon whether the data are field- or laboratory-generated. Field data validation will consist of verifying media-specific plan compliance and appropriate documentation of field activities. Laboratory data validation will consist of verifying that data generated are in compliance with media-specific plan-specified ASLs. Specific requirements for field data documentation and validation and laboratory data documentation and validation are in accordance with SCQ and FEMP procedures.

There are five analytical levels (ASL A through ASL E) defined for the FEMP in Section 2 of the SCQ. Field data documentation will be at ASL A and laboratory data documentation, in general, will be at ASL B. A more conservative ASL may be required for laboratory data in order to meet required detection

Silos 1 and 2 are the single largest source of direct (gamma) radiation at the FEMP. Therefore, TLD locations radiate outward from the silo area with emphasis on the nearby and publicly accessible western boundary of the site. The existing IEMP TLD monitoring network has been modified in late 2002 to take into account the pending relocation of the wastes stored in Silos 1 and 2. As necessary, current TLD locations will be adjusted and new TLD locations added to adequately characterize and monitor the direct radiation in the vicinity of the AWR project and the site fenceline. The following additional TLD locations were added to the Silo area:

- Location 43 located on the western side of the Silos, near the KNW-A radon monitor
- Location 44 located on the western side of the Silos, near the KSW-A radon monitor
- Location 45 located on the southern side of the Silos, near the KSO radon monitor
- Location 46 located on the project boundary south on the transfer tank area building
- Location 47 located on the project boundary south on the waste treatment facility.

Two of the five new monitoring locations (43 & 44) were selected based on the need to monitor direct radiation levels from the Silo wastes as the berm is excavated. The excavation of the berm will change the radiation shielding in place at the Silos and may affect radiation levels at the fenceline. These locations will also serve as secondary monitoring locations in the event that Silo construction activity eliminates locations 23A, 24, 25, and 26. Three new monitoring locations (45, 46, & 47) were selected based on the need to monitor direct radiation levels from the Silo wastes and their associated high levels of radon as the wastes are transferred from the Silos, to the transfer tank area, and eventually to the waste treatment facility. The location of these buildings within the Silos area is included in Figure 6-4. More specifically, the new locations were selected to monitor the movement of these materials as it affects radiation levels at the site fenceline.

Additional TLDs are located at air monitoring stations at the facility fenceline and at background measurement points. Figure 6-4 identifies the TLD monitoring locations.

The network of TLDs provides a mechanism to measure and track ambient radiation levels at the facility fenceline, from gamma emitting radioactive materials (primarily radium-226, thorium-232, and their decay products) that are handled and processed during remediation.

Three individual TLDs are placed at each location in order to assess the precision of the data. The TLDs are placed one meter above the ground and exchanged quarterly in accordance with industry standards and DOE guidance (DOE 1991). The TLDs are processed at the DOE Laboratory Accreditation Program-approved on-site dosimetry laboratory or equivalent vendor laboratory.

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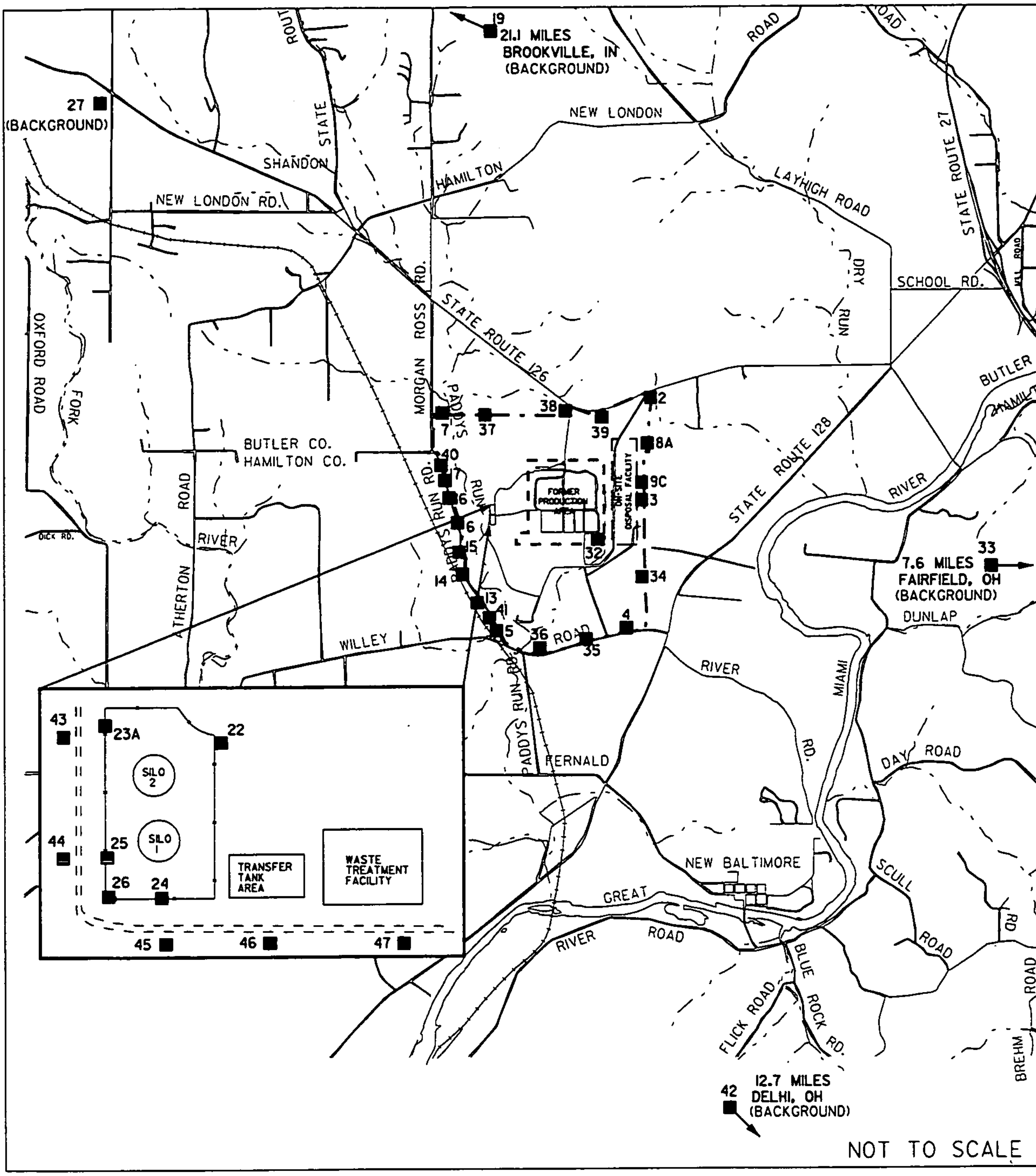

LEGEND:

DISTANCE FROM CENTER OF FORMER PRODUCTION AREA TO SAMPLE LOCATIONS OFF MAP

FEMP BOUNDARY

DIRECT RADIATION (TLD) MONITORING LOCATION

11-24-99

DRAFT FINAL

FIGURE 6-4. DIRECT RADIATION (THERMOLUMINESCENT DOSIMETER) MONITORING LOCATIONS

Data from the TLDs are used to assess the direct radiation component of the air pathway dose calculation (Appendix C). Table 6-4 summarizes the sampling and analysis plan for the direct radiation monitoring program.

TABLE 6-4

ANALYTICAL SUMMARY FOR DIRECT RADIATION (TLD)

Analyte	Sample Matrix	Sample Frequency	ASL[a]	Holding Time[b]	Preservative	Detection Level	Container
Gamma Radiation (TLD)	TLD	Quarterly	B	NA[c]	NA[c]	5 mrem	NA[c]

[a]The ASL may become more conservative if it is necessary to meet detection limits or data quality objectives.
[b]TLDs are read soon after collection by on-site laboratory (typically within one week).
[c]NA = not applicable

6.4.2.4 Meteorological Monitoring Program Design Summary

Although not a distinct component of the existing sitewide air monitoring program, the meteorological monitoring program is designed to provide data on the atmospheric conditions which influence the dispersion and transport of contaminants in the air pathway. This program provides critical data for the evaluation and interpretation of air monitoring data. The meteorological monitoring program also supports the design and operation of the IEMP air monitoring program and as such, is presented in this section.

The FEMP meteorological monitoring system consists of a single 60-meter meteorological tower located west of the Storm Water Retention Basin (Figure 6-1). Monitoring instruments record wind speed, wind direction, temperature, barometric pressure, precipitation, relative humidity, and store one-minute and 15-minute average data on the meteorological database. The system has been developed based on the requirements of DOE Order 5400.5 and DOE guidance (DOE 1991) and complies with industry standards for calibration and data recovery.

Meteorological data are used in the evaluation and interpretation of environmental data collected from the air, radon, and project-specific monitoring data. Short-term meteorological data will be used to relate air monitoring results to specific projects, when necessary. For example, if the results from a specific monitor are higher than expected, then the monitoring result would be evaluated using the wind rose developed from meteorological measurements collected during the monitoring period. A remediation project upwind of the monitor during the monitoring period would then be considered a possible source of the higher-than-expected results. In addition to supplying data necessary to support monitoring and surveillance, the meteorological monitoring system serves to support the day-to-day operations for construction, emergency preparedness, and engineering design.

6.5 MEDIA-SPECIFIC PLAN FOR SITEWIDE ENVIRONMENTAL AIR MONITORING

This section serves as the media-specific plan for implementation of the sampling, analytical, and data management activities associated with the sitewide environmental air monitoring program. The program expectations and design presented in Section 6.4 were used as the framework for developing the monitoring approach presented in this section. The activities described herein were designed to provide environmental data of sufficient quality to meet the intended data use as described in the program design in Section 6.4.2. All sampling procedures and analytical protocols described or referenced in this media-specific plan are consistent with the requirements of the FEMP Sitewide CERCLA Quality Assurance Project Plan (SCQ) (DOE 2002c).

The sitewide environmental air monitoring program is comprised of the following three distinct components:

- Radiological air particulate monitoring
- Radon monitoring
- Direct radiation monitoring.

The sampling and analytical aspects of each component are unique; therefore, this media-specific plan is organized to present a separate discussion of the sampling program for each component. The subsections of this media-specific plan define the following:

- Program organization and associated responsibilities
- Sampling programs (radiological air particulate, radon, and direct radiation)
- Change control
- Health and safety
- Data management
- Project quality assurance.

6.5.1 Project Organization

A multi-discipline project organization has been established and assigned responsibility to effectively implement and manage the project planning, sample collection and analysis, and data management activities directed in this media-specific plan. The key positions and associated responsibilities required for successful implementation are described below.

The project team leader will have full responsibility and authority for the implementation of this media-specific plan in compliance with all regulatory specifications and sitewide programmatic requirements. Integration and coordination of all media-specific plan activities defined herein with other project organizations is also a key responsibility. All changes to project activities must be approved by the project team leader or designee.

Health and safety is the responsibility of all individuals working on this project scope. Qualified health and safety specialists shall participate on the project team to provide radiation protection and industrial hygiene support and assist in preparing and obtaining all applicable permits. In addition, safety specialists shall periodically review and update the project-specific health and safety documents and operating procedures, conduct pertinent safety briefings, and assist in evaluation and resolution of all safety concerns.

Quality assurance specialists will participate on the project team, as necessary, to review project procedures and activities ensuring consistency with the requirements of the SCQ or other referenced standards and assist in evaluating and resolving all quality related concerns.

6.5.2 Sampling Program - Radiological Air Particulates

This sampling program is designed to collect radiological air particulate data which are representative of ambient air conditions at the facility fenceline (Figure 6-1). The data collected under this program will be used to assess the collective effect of concurrent remediation activities on the air pathway, provide continual feedback to the remediation projects on the effectiveness of emission controls, and provide a monitoring basis to support the implementation and track the effectiveness of corrective actions as necessary. As such, field procedures and analytical methods are designed to support the necessary level of data quality.

The monitoring design incorporates a network of 18 high volume continuous air monitoring stations. Filter media collected on a biweekly basis at AMS-2 through AMS-29 and WPTH-2 will be for total uranium on a biweekly frequency and isotopic thorium on a monthly frequency at analytical support level (ASL) B. ASL B provides qualitative, semi-qualitative and quantitative data with some quality assurance/quality control checks. A portion of each biweekly sample is retained for a quarterly composite sample, which is analyzed at ASL E by an off-site laboratory for those radionuclides expected to be the major contributors to dose. For the quarterly composites, ASL E provides quantitative data with fully defined quality assurance/quality control and complete data packages, including raw data and requires lower detection levels than ASL B. Section 6.4.2.1 and Appendix C provide greater detail on the sampling design.

Sample analysis will be performed at the on-site FEMP laboratory or a contract laboratory dependent on specific analyses required, laboratory capacity, turn-around time, and performance of the laboratory. The laboratories utilized for analytical testing must be approved by the FEMP in accordance with the criteria specified in Sections 3.1.5, 12.4, and Appendix E of the SCQ. These criteria include meeting the requirements for performance evaluation samples, pre-acceptance audits, performance audits and an internal quality assurance program. A list of FEMP-approved laboratories and current status of each is maintained by the FEMP quality assurance organization.

6.5.2.1 Sampling Procedures - Radiological Air Particulates

The air filters from the high volume air monitoring stations are collected and analyzed in accordance with the following procedures which incorporate the requirements of the SCQ listed below and the Environmental Regulatory Guide for Radiological Effluent Monitoring:

Standard Operating Procedure	
ADM-02	Field Project Prerequisites
SMPL-08	High Volume Air Monitoring
EQT-18	Calibration of Graseby GMW High Volume Air Sampler
ADM-09	Air Monitoring Data Review and Analysis
EW-0002	Chain of Custody/Request for Analysis Record for Sample Control

Table 6-5 provides the technical specifications for radiological air particulate monitoring using high volume air monitoring equipment and filter media.

TABLE 6-5

TECHNICAL SPECIFICATIONS FOR RADIOLOGICAL AIR PARTICULATE MONITORING

Monitor Type	Flow Rate	Filter Type	Gauge/Meters	Indicator
High volume continuous	45 cfm	Multi-ply polypropylene	Hours Flow Rate Set Point	Low Flow Warning Light

Sample collection is accomplished by using high volume air monitoring stations that continuously collect samples of airborne particulates. Any changes in flow rate are accounted for by the automatic flow controller in the monitor and are documented on a flow chart recorder which continuously records flow data. Air monitoring equipment must meet the following criteria per DOE guidance (DOE 1991) and industry practice:

- Environmental air samplers shall be mounted in locked, all-weather stations with the sampler discharge positioned to prevent the recirculation of air.
- The air sampling system shall have a flow-rate meter, and the total air flow or total running time should be indicated.
- The air sampling rate should not vary by more than 10 percent of the monitor set point of 45 cfm for the collection of a given sample.
- Linear flow rate across air particulate filters should be maintained between 20 and 50 meters per minute (m/min).
- Air sampling systems shall be flow-calibrated, tested, and routinely inspected according to written procedures (DOE 1991). Flow calibration shall be at least as often as recommended by the manufacturer.

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INTEGRATED ENVIRONMENTAL MONITORING PLAN

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
FERNALD, OHIO

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